68-70

THE SCOTTISH
GEOGRAPHICAL
MAGAZINE

Vol. 68, No. 1 April 1952

His late Majesty King George VI was Patron of the Royal Scottish Geographical Society for over fifteen years.

For us he was more than a mere figurehead. He accepted membership of the Society and, as Duke of York, presided personally at our Jubilee Meeting on 24th October 1934, in company with his Duchess. At the Society's banquet on the same evening, he proposed the toast of the Society in a speech, characteristic in the quality of its understanding, which will ever be cherished in our annals.

Recalling the work of noted explorers and missionaries, 'Scotland,' he said, 'certainly has the right to boast of a Geographical Society, for her sons from earliest times have gone forth over strange waters and sought their livelihood in new and distant lands. No race has provided better colonists or administrators, and after generations spent in far-off lands it is good to know they still uphold our good old Scottish traditions.'

'Speaking as one who has close touch with your country,' he continued, 'both through marriage and ancestry, I know these ties arouse a spirit of responsibility and understanding. . . . They are certainly an incentive to geographical enquiry.'

The speech from which these words were taken was the first occasion on which His late Majesty broadcast to the public.

We record our homage to the memory of a beloved Sovereign and a very brave man.

Tribute by the President, delivered at the meeting of the Society on February 14, 1952. Portrait (Copyright) by Drummond Young, Edinburgh.

SOME RELATIONS BETWEEN COUNTRY AND TOWN IN SCOTLAND

By J. B. Fleming and F. H. W. Green

The increasing extension of local and central government functions has entailed the taking of many decisions about towns and their relationships with their surrounding areas. In particular, the provisions of the 1947 Planning Acts and the preparation of Development Plans by Local Authorities require decisions as to the areas to be reserved in various towns for commercial, housing and other purposes. All this requires knowledge about the function of the town and its relationship with its surrounding area. The work described in this paper is an attempt to provide some of the necessary information on a uniform basis for the whole of Scotland. It is closely related to work done in England and elsewhere and so provides some interesting comparisons. Although this research was initiated on an *ad hoc* basis for a practical purpose, it may nevertheless be considered as an attempt to define human or social 'natural regions,' which are at least as important to the geographer as physical regions. This conception is implicit in much of what follows.

The relationship between a town and its surrounding area is not, of course, a simple one. Any particular town may be the centre of a different area for each different purpose which it serves, such as employment, shopping, entertainment, education, health services, etc., and its pattern of influence therefore may be, and for the larger towns certainly is, a very complex one. In spite of this, a fairly definite hierarchy can be distinguished in towns regarded as district and regional centres, and in a previous paper [1] the following five main orders of centre were recognised :—

First Order . . .	Metropolitan Centre
Second Order . .	Provincial Capital
Third Order . . .	Major Regional Centre
Fourth Order . .	Ordinary Regional Centre
Fifth Order . . .	Service Village

This hierarchy is, in general terms, applicable to most countries of western Europe, and the main characteristics of most towns in Scotland can be recognised as belonging to one or other of the orders. The historical development of the United Kingdom has prevented Scotland from having a first order centre in the full sense, but both Edinburgh and Glasgow perform some of the functions of a Metropolitan centre. The four cities clearly have the function of second order centres while towns like Inverness, Perth and Dumfries are typical of the third order.

Fourth order centres include a wide range of towns varying in size and character according to the physical features, the population density and the economic activity of their surrounding areas. Sometimes the areas which they serve are quite small, and in Scotland, *district centre* is perhaps a more appropriate name than *regional centre*. Examples of

the larger ones are Elgin, Stranraer and Kelso, but places like Turriff, Newton Stewart, and Kyle of Lochalsh also have the characteristics of this order.

Scotland has comparatively few nucleated villages in the English sense, and fifth order centres are less common than south of the Border. Their function in England is performed in Scotland by the small towns of the fourth order. There are however a few examples, and places like Gifford and Glenluce are probably of this type.

Although it is comparatively simple to recognise the existence of such an urban hierarchy and to realise that the urban centre is the focus of activity for a surrounding area, it is much less easy to define the boundaries of such areas. In the first place, there is for each town a series of non-coincident areas related to different functions ; this is particularly the case with the towns of the second and third orders which will also function as fourth order centres for limited areas. Thus Edinburgh has the whole of Scotland as its hinterland for some purposes, such as Government and legal administration, south-east Scotland as its hinterland for other purposes, such as higher education, and its immediate surroundings in Midlothian for still other purposes, such as weekly shopping. In the second place, the boundaries of such hinterlands are not clear cut lines, but are more or less wide zones which will change from time to time in response to economic and social factors.

Many methods of defining such hinterlands, if we may be allowed to use this term for want of a better, have been devised from time to time. The most exact, but at the same time the most laborious and expensive, is the questionnaire method, while at the other end of the scale are rule of thumb methods using simply distance or distance combined with population as the basis, such as those used by some American economists to define market areas. An example is Reilly's empirical Law of Retail Gravitation[2] which states that the 'pull' of a town is in general directly proportional to size, expressed in terms of population, and inversely proportional to distance squared. The graphical application of this law results in describing 'circles of Apollonius'—familiar in navigational and tactical problems. Figure 1 demonstrates the law as applied to the essentially comparable four cities of Scotland, a very realistic result being obtained. Much of interest can be learned from a comparison of Reilly's theoretical results with those obtained by a survey, such as is described in this paper.

For most purposes, however, what is required is a method of defining hinterlands which, while not requiring the resources demanded by a questionnaire survey, will give results of some detail, and for this an index which will define an average hinterland is needed. Owing to the constant variation of such areas the index must also be flexible and responsive to changes in conditions and habits. It is contended that in the United Kingdom 'bus services provide the most suitable index of this kind, and work done in England and Wales,[1] in Northern Ireland [3] and elsewhere, suggested that their use would produce valuable results in Scotland. The detail of the method used has been described elsewhere, but may be briefly recapitulated.[1] A 'bus centre, i.e. a fourth order centre, was defined as any place which had some, if not all,

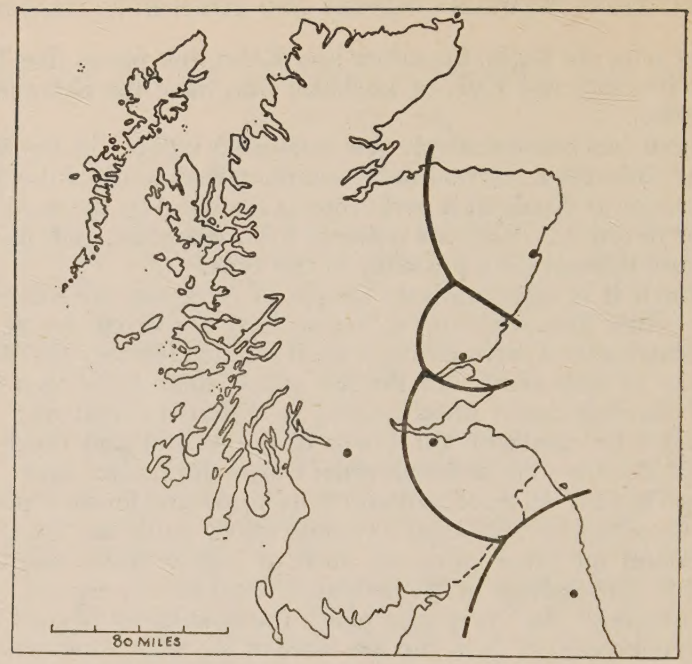

Fig. 1. Scotland. Trade areas of the Cities according to Reilly's Law.

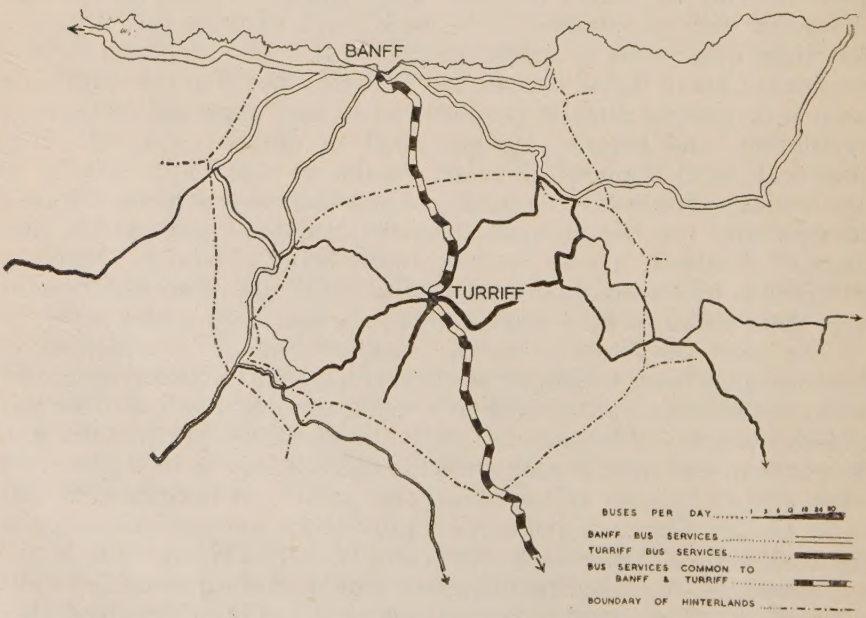

Fig. 2. Bus routes from Banff and Turriff, showing the method of drawing boundaries of hinterlands.

of its 'bus routes serving no place larger than itself. Diagrams were constructed to show the routes radiating from these centres and by superimposing these diagrams the hinterland boundaries were drawn. An example is given in Fig. 2. Since many of these lines indicate only that on one side a majority of 'buses travel to one town and on the other side the majority travel to another town, they are best regarded as the centre lines of transition zones, or as ' watershed ' boundaries ; they may be analogous to a sharp intermontane crest-line or they may be like the almost imperceptible Great Divide of the Canadian prairies, but they are equally real in either case. To make the method effective it was, of course, necessary to ensure that all 'bus services were taken into account, the small one-'bus operators no less than the large companies, and the very helpful co-operation of the offices of the Traffic Commissioners in Edinburgh and Aberdeen, which ensured this, must be gratefully acknowledged.

It has been suggested that hinterlands defined by private car journeys would be different from those defined by 'bus services. This is not strictly relevant, for even if this were so, it would not disprove the general validity of the 'bus service method. But it is very interesting to study the results of a survey of all motor cars seen parked in Haddington on a market day afternoon (Figure 3) and to compare their registration addresses with the 'bus hinterland. It will be seen at a glance that there is a good fit,* except on the west, where in fact an explanation is not far to seek ; there is here an area in which the mining population overshadows in numbers the agricultural one. 'Bus services show the greater part of the population, i.e. the mining community, focussing on Tranent, while naturally the smaller agricultural interests—whose farms are the registered addresses of most of the motor cars concerned—look to Haddington market.

In applying the method it was found that, if the definition of 'bus centre was strictly applied, a number of places qualified as centres, whose hinterlands were not really separable from those of a neighbouring larger centre ; Dalkeith in relation to Edinburgh is an example. Such places were defined and mapped as ' subsidiary ' centres, and generally they were defined as those places where the number of 'buses operating from the centre to smaller places was small compared with the total number of 'buses passing through the centre.

The result of mapping the centres and their hinterlands on this basis for Scotland is shown on the folding map. The significance of the information clearly differs with the density of population and the closeness of the communication network in different parts of the country. In order to give an indication of this significance, the country has been divided into two zones on the basis of population distribution and settlement pattern. This broad division is perhaps an oversimplification, but it clarifies the analysis and does represent a factor in the social geography of Scotland. In the lowland zone of continuous population the network of communications is fairly close and each settlement is connected with its neighbours by areas containing at least a minimum rural population ; there are unpopulated ' islands,' such as the Ochils and the Pentlands, within the zone, but the area of

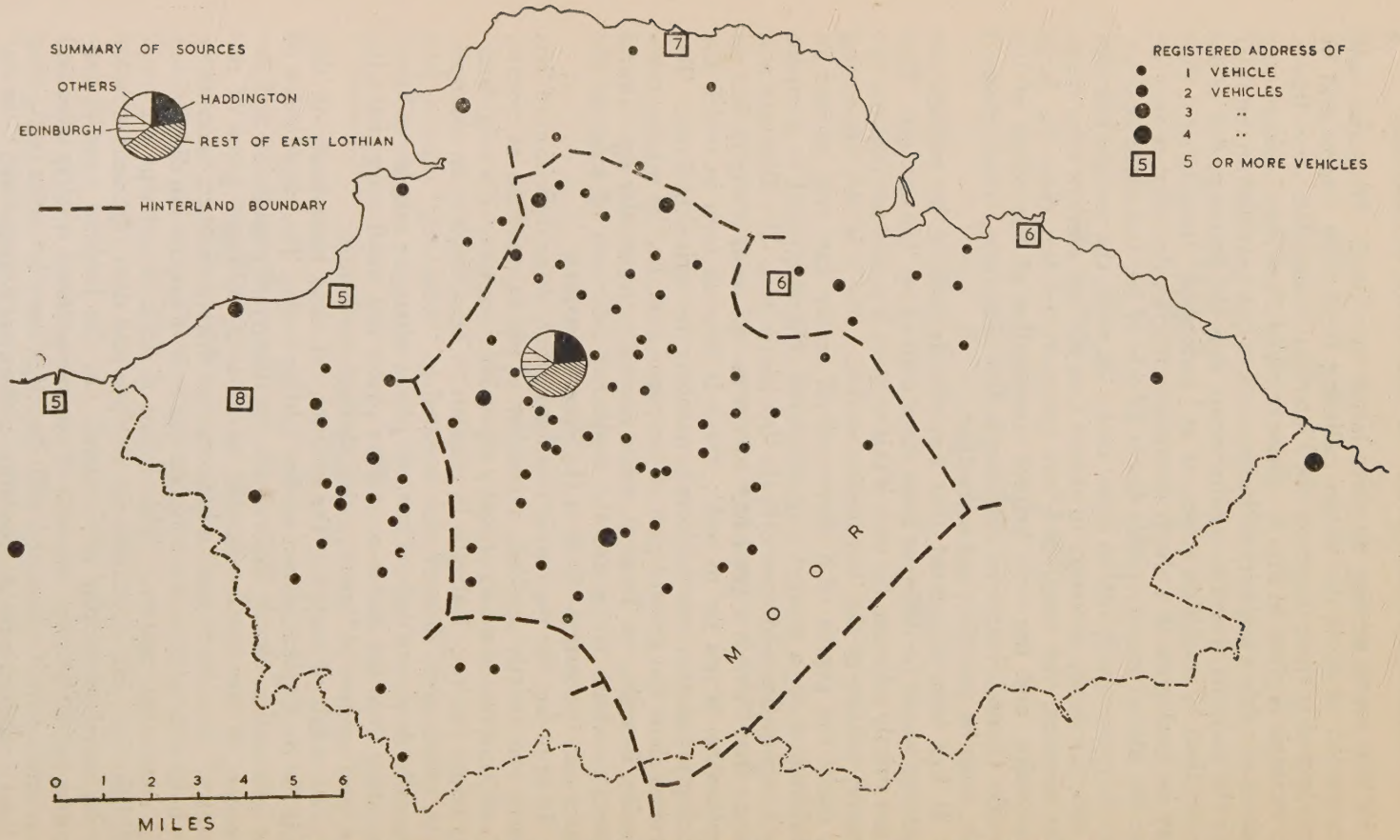

Fig. 3. Sources of vehicles parked in Haddington on Market day, 19th October, 1951.

these is small compared with the continuously populated areas. In this zone each centre has direct communication with a number of neighbouring centres, and the limits of its hinterland may be taken as representing a balance achieved as a result of a continuing process of adjustment between competing centres. The boundaries of these hinterlands are liable to change with the growth and decline of towns and with the changing distribution of population.

In the rest of the country the communication network is not continuous and the routes from any particular centre are usually confined to one or two directions while, in many parts, frequent changes in the form of transport used are necessary : from train to steamer, 'bus to ferry, etc. Many of the hinterland boundaries are therefore defined by physical features such as mountain watersheds or sea lochs and the competition between adjacent centres is necessarily less. In spite of the fact that in drawing the boundaries in this area steamer and ferry services were taken into account, the boundaries are rather different in nature from those of the continuously populated areas ; there is less room for change in their position, though the centres themselves may rise or decline in importance with changing population movements.

The map gives a picture of the present pattern of the changing influence of fourth order centres and of the extent to which the areas they serve are clearly defined as well as giving an indication of some of the factors influencing the development of their hinterlands. In very few cases does the shape of the hinterland approximate to the theoretical hexagon which would result from evenly spaced equally powerful centres, or to the interlocking circles often seen in some types of planning reports. Turriff and Forfar have hinterlands which approach most nearly to such shapes. As might be expected, the hinterlands frequently tend to be elongated along main traffic routes, and on such routes small towns appear less likely to qualify as centres unless they are a considerable distance from the nearest larger town or are in an area intermediate between two larger towns. Stirling and Cupar are examples of elongated hinterlands, and in the former case the hillfoot towns of Clackmannan have been prevented from qualifying as centres by the influence of the larger town. Harthill, between Edinburgh and Glasgow, is a good example of a small place which has an elongated hinterland along a main traffic route ; Mintlaw in Aberdeenshire is another. It is also noticeable that the hinterlands of many places tend to be developed to a greater extent on the side of the centre remote from the nearest larger centre. Haddington, Callander and Crieff are examples of this tendency.

It must be again emphasised that in respect of the larger towns, and particularly of the cities, the hinterland shown on the map is the area within which these towns serve as fourth order centres and not in any sense their whole sphere of influence. The map shows interesting contrasts, in this sense, between the hinterlands of the four cities. Aberdeen has the largest hinterland in Scotland and has no less than eight centres subsidiary to it, while Dundee has a relatively small hinterland confined approximately by the watershed of the Sidlaws. In fact Perth, with only a quarter of the population, has a considerably

larger hinterland than Dundee and this seems to accord with the results of general observation. It is true that Newport and Wormit on the south side of the Tay Estuary are virtually residential suburbs of Dundee, but the addition of their small hinterlands would add little to that of the city.

Glasgow is in quite a different position from Aberdeen and has a greater resemblance to Dundee. Its hinterland is much larger in population but much smaller in area than that of Aberdeen, and only towards the south does it reach appreciably over ten miles from the city centre. In all other directions large neighbours lie close to it. Edinburgh, on the other hand, resembles Aberdeen, its nearest neighbours of any significance being Bathgate, Haddington and Peebles.

To turn to the general pattern of hinterlands shown on the map, it is noticeable that in a number of places there are necks and lobes in the hinterlands. In a number of cases these are in the nature of cartographic conventions to avoid the problem of showing outliers of the hinterland of one centre as 'islands' in the hinterland of another, but whether there is direct road communication through the neck or not, these shapes represent definite circumstances which deserve examination. In the first place it would be wrong to assume that in these areas the boundaries of the hinterlands are sharply defined. They are, of course, what the present 'bus services show, but the proper and safe conclusion to draw in such cases is that they represent areas of mixed allegiance which, as such, are worthy of special attention. Very often a small town is to be found in such areas and it may be concluded that 'bus operators must have found that it had not sufficient drawing power in the district to warrant operating a service to it alone.

Auchtermuchty provides a good example of this situation. It lies on a through 'bus route from Cupar to Stirling, and this is crossed almost at right angles by 'bus routes from Perth to Kirkcaldy and Leven, but there is no 'bus service in or out of the town which does not serve a larger place. It may be reasonably concluded from the pattern that the people living both to the east and west of Auchtermuchty make the majority of their journeys to Cupar, while in the town itself Perth has the greatest attraction by a very small margin. From the area immediately to the south of the town the majority of journeys are made to Kirkcaldy, but the competition of Perth is probably considerable. Further, since it is at a point of such divided allegiance, it is reasonable to draw the further conclusion about Auchtermuchty itself, that any development of shops, factories or services would be likely to have a considerable effect. It might be found that such additional facilities would attract a majority of people living in the surrounding areas, particularly to the west, and Auchtermuchty might become a centre in its own right. The pattern certainly indicates that such development in Auchtermuchty would be likely to have a greater effect than it would in, say, Ladybank.

In studying towns as centres the population of the area which they serve is at least as important as its size and shape, and estimates have been made of these populations, using the parish figures from the Preliminary Report of the 1951 Census.

Main Centre
Boundary of Hinterland
Subsidiary Centre
Boundary of Hinterland
NORTH SEA
IRISH SEA
NORTH CHANNEL
Firth of Clyde
Firth of Forth
Solway Firth
Luce Bay
Wigtown Bay
Mull of Kintyre
Ardnave Pt.
Corsewall Pt.
Girvan
Ayr
Troon
Prestwick
Ardrossan
Saltcoats
Irvine
Kilwinning
Stevenston
Ardeer
Largs
Millport
Cumbrae
Fairlie
Greenock
Gourock
Port Glasgow
Dumbarton
Clydebank
Glasgow
Paisley
Renfrew
Johnstone
Kilmarnock
Hamilton
Motherwell
Wishaw
Coatbridge
Airdrie
Cumbernauld
Falkirk
Grangemouth
Bo'ness
Linlithgow
Edinburgh
Leith
Musselburgh
Haddington
Dunbar
North Berwick
Bass Rock
St Abbs Hd
Eyemouth
Cockburnspath
Berwick upon Tweed
Tweedmouth
Spittal
Holy I.
Lindisfarne
Bamburgh
Belford
Alnwick
Whittingham
Rothbury
Longhorsley
Morpeth
Ashington
Bedlington
Blyth
Whitley Bay
Tynemouth
Cullercoats
Wallsend
Newcastle
Gosforth
Hexham
Tyne Gap
Haltwhistle
Corbridge
Wall
Chollerford
Bellingham
Wark
Whalton
Otterburn
Jedburgh
The Cheviot
2676
Kelso
Roxburgh
Selkirk
Galashiels
Peebles
Innerleithen
Melrose
Hawick
Teviotdale
Eskdalemuir
Langholm
Lockerbie
Ecclefechan
Gretna
Gretna Green
Longtown
Annan
Dumfries
Castle Douglas
Kirkcudbright
Gatehouse of Fleet
Newton Stewart
Wigtown
Whithorn
Port William
Stranraer
Port Patrick
Portpatrick
Glenluce
Stoneykirk
Drummore
Mull
Tobermory
Craignure
Lochaline
Oban
Kerrera
Connel
Ballachulish
Glencoe
Kinlochleven
Fort William
Ben Nevis
4406
Ben Cruachan
3689
Ben More
3169
Ben Lawers
3984
Schiehallion
3547
Ben Lomond
3192
Ben Ledi
2875
Ben Vorlich
3224
Ben Venue
2393
Ben Chonzie
3048
Ben Vrackie
2757
Ben Macdui
4296
Cairngorm
4084
Lochnagar
3786
Glen Lyon
Loch Tay
Loch Rannoch
Loch Earn
Loch Lomond
Loch Awe
Loch Fyne
Loch Etive
Loch Linnhe
Loch Leven
Loch Katrine
Loch Venachar
Loch Voil
Loch Doine
Loch Achray
Loch Ard
Loch Lubnaig
Loch Tummel
Loch Rannoch
Loch Garry
Loch Ericht
Loch Laggan
Loch Arkaig
Loch Lochy
Loch Oich
Loch Ness
Loch Shiel
Loch Eil
Loch Sunart
Loch Moidart
Loch Shiel
Loch Morar
Loch Nevis
Loch Hourn
Loch Duich
Loch Alsh
Loch Carron
Loch Torridon
Loch Maree
Loch Ewe
Loch Gairloch
Loch Broom
Loch Kanaird
Loch Inver
Loch Assynt
Loch Shin
Loch Naver
Loch Eriboll
Loch Hope
Loch Laxford
Loch Inchard
Loch Glendhu
Loch Stack
Loch Eriboll
Loch Erisort
Loch Seaforth
Loch Roag
Loch Tarbert
Loch Resort
Loch Boisdale
Loch Skiport
Loch Eynort
Loch Aline
Loch Sunart
Loch Moidart
Loch Shiel
Loch Eil
Loch Arkaig
Loch Lochy
Loch Oich
Loch Ness

URBAN HINTERLANDS
As determined by the study of motor bus services
Statute Miles
0 10 20 30
Kilometres
0 10 20 30 40 50
OUTER HEBRIDES
LEWIS
Stornoway
Butt of Lewis
Barvas
Tolsta Hd
Carloway
Broad B
Eye Peninsula
Ness
Eriskort
North Minch
Scarp
Taransay
Harris
Tarbert
Sound of Shiant
Shiant Is
Pabbay
Bernera
Sound of Harris
North Uist
Sound of Monach
Monach Is
Benbecula
Little Minch
Rudha Hunish
Kilmaluag
Quirang
Loch Snizort
Ug
The Storr 2360
Dunvegan
Portree
Bracadale
SKYE
Loch Dunvegan
Sound of Raasay
Inner Sound
South Uist
Lochboisdale
Eriskay
Barra
Castlebay
Canna
Sound of Canna
Rum
Mallaig
Arisaig
Loch Nevis
Loch Morar
Glenfinnan
Kyle of Lochalsh
Sligachan
Cuillin Hills
Coruisk
Broadford
Kyleakin
Strome Ferry
Loch Carron
Applecross
Loch Torridon
Loch Shieldaig
Loch Maree
Kinlochewe
Glen Carron
Achnasheen
Loch Monar
Strathcarron
Glen Affric
Glen Cannich
Glen Urquhart
Drumnadrochit
Loch Ness
Foyers
Halls of Foyers
Fort Augustus
Caledonian Canal
Loch Oich
Glen Garry
Loch Quoich
Loch Arkaig
Loch Lochy
Glen Spean
Creag Meagaidh 3700
Ben Nevis 4406
Fort William
Corpach
Banavie
Glen Roy
Glen Monarch
Glen Moriston
Loch Inchard
Loch Laxford
Scourie
Eddrachillis Bay
Ben Hope 3040
Foinaven 2980
Ben Loyal 2504
Altnaharra
Loch Naver
Ben Klibreck
SUTHERLAND
Kinlochbervie
Rhu Coigach
Enard Bay
Loch Assynt
Ben More Assynt
Inchnadamph
Loch Shin
Lochinver
Suilven
Summer Is
Loch Broom
Ullapool
Greenstone Pt
Gruinard Bay
Rudha Reidh
Ben Dearg 3547
Strath Oykel
Strath Bran
Lairg
Oykell
Rogart
Golspie
Brora
Helmsdale
Kinbrace
Morven
Latheron
Lybster
Berriedale
Wick
Sinclair's B
Thurso
Castletown
Halkirk
Watten
Scrabster
Dunnet Hd
Pentland Firth
Stroma
Swona
South Ronaldsay
Pentland Skerries
Duncansby Hd
Dunnet Bay
Strathy Pt
Melvich
Strath Halladale
Strath Naver
Tongue
Kyle of Durness
Durness
C. Wrath
Hurlnessa
CAITHNESS
Dornoch
Dornoch Firth
Tarbat Ness
Tain
Fearn
Ardgay
Bonar Bridge
Kyle of Sutherland
Invershin
Lairg
Strath Brora
Strath Fleet
Ben Wyvis 3429
Glass Mhor
Glass Hill
Invergordon
Cromarty Firth
Cromarty
Findhorn
Burghead
Lossiemouth
Elgin
Forres
Rothes
Craigellachie
Spey
Dufftown
Keith
Buckie
Cullen
Portgordon
Fochabers
Banff
Portsoy
Macduff
Rosehearty
Fraserburgh
Kinnaird Hd
Rattray Hd
Aberchirder
New Pitsligo
Strichen
Turriff
Buchan
New Deer
Peterhead
Boddam
Port Erroll
Buchan Ness
Cruden B.
Ellon
Old Meldrum
Insch
Oyne
Chapel of Garioch
Inverurie
Newburgh
Udny
Dyce
Kintore
Echt
Aberdeen
Girdle Ness
Torphins
Peterculter
Tarland
Aboyne
Dee
Banchory
Drumoak
Ballater
Balmoral Castle
Braemar
Linn of Dee
Lochcallater
Cairn Toul 4241
Ben Macdhui 4296
Cairn Gorm 4084
Braeriach
Aviemore
Kincraig
Kingussie
Newtonmore
Strathspey
Monadhliath Mts
Loch Insh
Loch Alvie
Tomatin
Carrbridge
Nethybridge
Boat of Garten
Tomintoul
Grantown on Spey
Cock Br
Dava
Forres
Nairn
Inverness
Black Isle
Beauly
Beauly Firth
Muir of Ord
Dingwall
Strathpeffer
Conon Bridge
Maryburgh
Evanton
Alness
Ardross
Tarbat Ness
Moray Firth
Tarradale
Munlochy
Culbokie
Fortrose
Cromarty
Resaurie
Rosemarkie
Fort George
Ardersier
Cawdor
Auldearn
Nairn
Culloden
Culloden Moor
Drumossie Moor
Clava
Culloden Viaduct
Daviot
Dunlichity
Moy
Loch Moy
Loch Ericht
Loch Rannoch
Loch Tummel
Loch Garry
Loch Laggan
Loch Treig
Loch Lochy
Loch Arkaig
Loch Eil
Loch Linnhe
Loch Leven
Loch Etive
Loch Awe
Loch Fyne
Loch Long
Loch Lomond
Loch Katrine
Loch Achray
Loch Venachar
Callander
Aberfoyle
Trossachs
Ben Lomond 3192
Ben Venue 2393
Ben Ledi 2875
Ben Vorlich 3224
Ben Lui 3708
Ben Cruachan 3689
Ben Nevis 4406
Glencoe
Kinlochleven
Ballachulish
Fort William
Corpach
Banavie
Glen Roy
Glen Spean
Glen Nevis
Glen Coe
Glen Etive
Glen Orchy
Glen Lyon
Glen Tilt
Glen Shee
Glen Clova
Glen Isla
Glen Prosen
Glen Esk
Glen Doll
Glen Muick
Glen Gairn
Glen Avon
Glen Livet
Glen Rinnes
Glen Fiddich
Glen Grant
Glen Dronach
Glen Isla
Glen Ogil
Glen Lethnot
Glen Mark
Glen Tanar
Glen Dye
Glen Feshie
Glen Tromie
Glen Truim
Glen Banchor
Glen Urquhart
Glen Affric
Glen Cannich
Glen Strathfarrar
Glen Orrin
Glen Carron
Glen Torridon
Glen Shieldaig
Glen Garry
Glen Moriston
Glen Urquhart
Glen Convinth

The distribution of the centres according to the population of their hinterlands is shown in the following table, in which the hinterland populations of the main centres have been taken as exclusive of subsidiary centres and their hinterlands. The hinterland of Glasgow has been excluded from the table because at 242,000 it has more than three times the population of any other hinterland.

A total of 235 centres was identified in Scotland compared with 700 in England and Wales. The total of 235 includes 169 main centres and 66 subsidiary centres, 153 (109 main and 44 subsidiary) being in the continuously populated zone and 82 (60 main and 22 subsidiary) in the rest of the country.

Distribution of Hinterlands by Area and Population

POPULATION (thousands)	AREA IN SQUARE MILES						
	0-25	25-50	50-100	100-200	200-400	over 400	Totals
0-1	28	6	6	11	5	—	56
1-5	21	22	21	20	15	6	105
5-10	5	3	7	11	7	4	37
10-20	3	3	3	2	2	5	18
20-60	—	2	5	5	4	2	18
Totals	57	36	42	49	33	17	234

Note :—Glasgow is excluded. No distinction is made between Main and Subsidiary centres.

The most striking fact about these figures is that in general the populations are small. For the whole of Scotland the mean hinterland population is only 6000, while even for the *populated area* the average is only 8000, compared with 16,000 for England and Wales. There is a similar contrast in the frequency distribution of the hinterlands by population. In Scotland more than half are under 5000, and nearly three-quarters under 10,000, while in England and Wales less than a third are under 5000, and a half under 10,000. Northern Ireland and Denmark, for which similar calculations have been made, bear more resemblance to England and Wales than to Scotland.

These differences are significant, and it is suggested that the reason for them is to be found in the different settlement pattern of Scotland. The lack of villages, in the English sense, means that fifth order centres are rare, and it may be that the method of using 'bus services defines centres which are intermediate in function between the fourth and fifth order centres of England.

Apart from Glasgow, Paisley has the hinterland with the largest population—58,000; Aberdeen comes next with 52,000, followed by Edinburgh, Hamilton and Ayr all with about 50,000. Dundee, with 22,000, is well down the list, while of the smaller places, Elgin, Lochgelly and Cumnock have surprisingly large hinterlands with populations of 26,000, 22,000 and 21,000 respectively. As important as the absolute

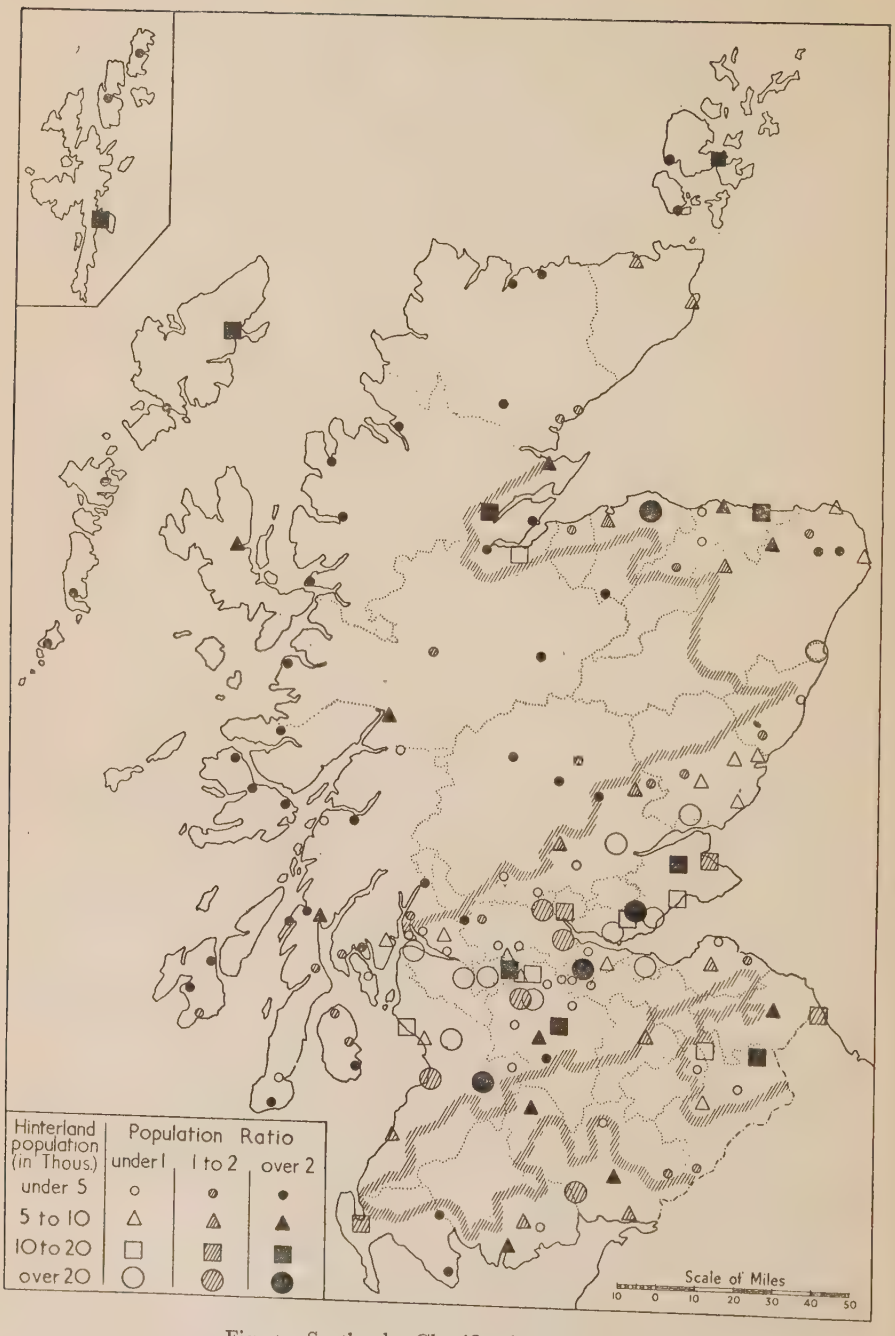

Fig. 4. Scotland. Classification of Centres.

size of the hinterland population, is its size relative to the population of the centre, because this gives a measure of the importance, to the town itself, of its function as a centre.

Figure 4 shows both aspects of the population study, the total hinterland population and the ratio between the hinterland and centre populations; in the case of the latter a simple three-fold classification has been used, depending on whether the ratio is less than one, between one and two, or over two. While the significance of this grouping must not be exaggerated, one can regard the towns in the first group as those in which the function of fourth order centre is unimportant compared with the other activities of the town, and those in the third group (ratio over 2) as the ones which primarily function as fourth order centres.

In most of the Large Burghs this ratio is less than one. In most cases the limited importance of their service function relative to their other activities is the result of their primarily industrial character (e.g. Paisley, Kirkcaldy), but in others the low ratio is probably due to the fact that the towns are more important as third order than as fourth order centres. Inverness and perhaps Perth are of this kind. The service element in many of these towns is relatively unimportant in the town itself, but it is important to remember that such towns do act as fourth order centres for a very large proportion of the population. Smaller towns which have a ratio of less than one are in many cases fishing towns, like Fraserburgh and Buckie, which are traditionally distinct from the land behind them, or are towns primarily dependent on one industry, like Cowdenbeath and Hawick.

The towns which have a ratio of between one and two, and which may be regarded as those in which the service function is fairly evenly balanced with some other activity, are of various kinds. The most important are the small centres in rural areas which have some additional industry, like Blairgowrie and Kirriemuir, and holiday resorts like Nairn, Peebles and St Andrews. This group also includes some larger towns, particularly old market towns which have developed industrially, like Dumfries, Hamilton and Stirling.

Apart from those in the Highlands, which will be dealt with separately, the centres with a ratio of more than two are found mainly in the agricultural areas and are towns with very little industry apart from service industry; Dingwall, Duns, Cupar, Banff, and Kelso are examples, all but the last being also county towns. Some old-established towns which have become the centres of mining or industrial areas also have this ratio, Cumnock, Bathgate, and Douglas being examples. In addition this group includes a number of centres with very small populations, like Mintlaw in Aberdeenshire and Muirhead in Lanarkshire ; these are probably better regarded as communication centres rather than as service centres.

It will be clear, from what has been said above, that this method of analysis cannot be applied unmodified to the Highlands and other areas where the distribution of population is very scattered. The different significance of the hinterland boundaries in such areas has already been remarked on, and the kinds of centres identified also differ from those in the continuously populated areas. In the case of the

larger centres such as Wick, Thurso, Stornoway and Oban the results are comparable with those for the rest of the country ; the low ratio for Oban is probably due to the fact that, like Inverness, it is more important as a third order centre than as a fourth order centre, and those for Wick and Campbeltown to the presence of some industry. The other centres in the west and north seem to fall into two groups : the first, which includes places like Portree and Kyle of Lochalsh, has some similarity with lowland centres in that there are smaller places within their hinterlands. Within the hinterland of Kyle of Lochalsh, for example, there are shops at certain small places like Dornie and Plockton, but a somewhat greater variety of facilities, modest though it may be, is available at Kyle. On any method of definition based on fixed services and facilities it would be difficult to equate Kyle with, say, Bathgate, yet it could be asserted that both are fourth order centres which exert the same relative hold over their hinterlands.

The second group, which merges into the first, includes all the very small places which are identified as centres ; in the hinterlands of these there are normally no other hamlets with any facilities at all, and the centres may be thought of as both fourth order and fifth order. In some cases the centres which have been identified have virtually no facilities at all and are trans-shipment points rather than service centres. Port Askaig in Islay and Salen and Craignure in Mull are examples. Much more detailed investigation than has been possible in this paper is required to explain all these points, but it is true to say that one reason for the different results in the Highlands is the circumstance that a large proportion of the population living there is not in fact provided with service centres of the standard available in the rest of the country.

The whole of this study should be regarded as a reconnaissance survey and it is hoped that it will provide a framework for more detailed examination of particular areas or particular kinds of hinterland.

The authors would like to acknowledge the assistance given by Miss E. M. Norton and Miss M. Y. Nicolson in the drawing of the original maps. The survey of parked vehicles in Haddington was carried out jointly with Mr F. P. Tindall, County Planning Officer of East Lothian.

* This is seen to be even more remarkable when studied with a one-inch map, which reveals that within the 'bus hinterland almost every farmstead had sent a car into Haddington on that day, whereas beyond that hinterland, except towards Tranent, this was not the case.

REFERENCES

[1] Green, F. H. W. Urban Hinterlands in England and Wales : An Analysis of Bus Services. *Geographical Journal*, 1950, 116 (1-3) : 64-88.

[2] Reilly, W. J. The Law of Retail Gravitation. New York : published by the author, 1931. See also Retail Trade Areas in Illinois, by P. D. Converse, *University of Illinois Business Studies*, No. 4, Urbana, Illinois, 1946.

[3] Green, F. H. W. Town and Country in Northern Ireland. *Geography*, 1949, 34 : 89-96.

CLIMATE AND FAMINES IN NORTH EAST SCOTLAND

By Kenneth Walton

At a low level of cultural and technological achievement, food shortages and climatic variations are closely linked. They have been the object of much research in those regions of the world where the contemporary rural economy is based on subsistence agriculture. There have, for instance, been geographical studies of famine areas in Monsoon Asia and Africa,[1] but the importance of famine and food shortage also needs to be stressed in any consideration of the historical geography of the British Isles in general, and of Scotland in particular. It is, therefore, of some importance to indicate the extent and effect of famines on the changes which have taken place in this country.

A great deal more research will be necessary before the whole story can be known and the value of the factors assessed. It is made more difficult for reasons of the size of the area involved and the time span during which famines were important. Much of the information which could solve the problem, especially the numbers of people involved, is to be found in the records of the Kirk Sessions : at the time of the famines the Kirk was the recorder of every aspect of the life of the common people, especially the inhabitants of the farming townships and kirktowns which were the essential basis of the settlement pattern.

This review has therefore been limited, for reasons of brevity and material, to the North East Lowlands, a region which lagged behind the rest of lowland Scotland in agricultural development because of its isolation, rigorous climate and the high percentage of reclaimable, but at that time unproductive, land. The time span has also been limited to the eighteenth century for a number of reasons : it has been the most fully recorded ; it was probably the most formative period in the evolution of the area, a time of flux and change in agriculture and rural manufactures ; and it was, for the greater part of the period, a time of subsistence agriculture and poor communications.

Climate had a universal influence on all sections of the population, especially on the farmers, who were, to a certain extent, forced to change their agricultural techniques owing to climatic conditions. These changes in crops and agricultural methods have made the population less dependent on the vagaries of the climate, but in the eighteenth century and earlier, crop failure through frosts, unseasonable temperatures, excessive rainfall and floods was an important population factor. There are many records of the effect of climate in producing food shortage and famine, and occasional records of the epidemic diseases which were liable to sweep the country when resistance was diminished as a result of inadequate nutrition.

In the eighteenth century there was, throughout Scotland, an almost universal dependence on home grown cereal crops for the primary food supply of the labouring and other classes. In the North

East, oatmeal was the basis of every meal of the day, forming the main dish at breakfast, or mixed with boiled kale or cabbage at supper. It was also the basis of the bread which was eaten with every meal. Meat was usually restricted to one meal on Sunday, though fish from the sea or river was always an important constituent of the diet. In fact, near the salmon river of the Dee, " the lower orders of Aberdeen and district were so accustomed to salmon dinners that it was customary for farm servants while being engaged to stipulate that salmon should not be served beyond three times a week." [2] Any restriction in the supply of the basic cereal was liable to cause hardship, food shortage, and, in extreme cases, loss of life.

There is some evidence of famines occurring before the eighteenth century. There was famine, for instance, in 1578, and in 1687 the Synod of Aberdeen appointed a day of humiliation on account of the very bad season. There were " great deluges of rain and constant mists and fog . . . whereby the corn in fields and stackyards was in danger of heating and rotting and so being destroyed." [3] Six years later began one of the most disastrous periods in the history of Scotland. In seven years there was only one good season, that of 1699, which was of sufficient distinction for the Church to make it a Year of Thanksgiving.

The " Seven Ill Years " or, as they were called by ardent Jacobites, " King William's Dear Years " were years of dearth over the greater part of Scotland, though they were felt more severely in the north. According to the graphic description of one reporter in the South West of Scotland, " these manifold unheard-of judgements continued seven years, not always alike, but the seasons, summer and winter (were) so cold and barren, and the wonted heat of the sun so much withholden that it was discernible upon the cattle, flying fowl and insects decaying, seldom a fly or a cleg was to be seen ; our harvests (were) not in the ordinary months ; many were shearing in November and December, some in January and February ; many contracted their deaths and lost the use of feet and hands working in frost and snow ; and after all, some of it was still standing and rotting upon the ground ; much of it was of little use to man or beast and it had no taste or colour of meal." [4]

To meet the situation, the importation of grain, which had been prohibited by an Act of 1672, was recommenced in 1698. At the same time the export of grain was prohibited in order to conserve supplies. Grain was obtained from England and, to facilitate its distribution, the usual customs duty was rescinded and a payment of twenty pence made to the carriers for each boll of grain carried. In spite of this, transport and distribution were so hindered by poor communications and lack of purchasing power that the inland districts suffered severely, and the import by sea was hindered by the activities of French privateers.

To the North East the lack of grain was disastrous. It led to wholesale deaths and depopulation and had important effects on the agricultural economy. Of the famine effects recorded, those in the interior were the worst, whereas the earlier districts of Moray and the Buchan

coast, where frosts are less intense, suffered less, and in some cases could supply other areas. It is said, for instance, that people went from Angus to Morayshire to buy oatmeal, which involved a journey on foot or horseback across the Mounth Barrier which separates the North East Lowlands from Strathmore.[3] Even if the grain was obtainable, however, very few people could afford to buy, and carts to carry it in quantity were practically unknown in the North East till after 1760. The result was a high mortality rate, which probably affected most severely the aged, the nursing mothers and the children who had been weaned. The exact effect on the various age groups cannot be known.

There is, in the Old Statistical Account, a reference to the famine in the parish of Monquhitter, situated on one of the low interfluves in the interior of Buchan. It was said that " one Thompson, wadsetter of Hairmoss, driven from his home by want, was found dead, near the shore, with a piece of raw flesh in his mouth. Of sixteen families that resided on the farm of Littertie, thirteen were extinguished. On the estate of Greens which (in 1793) accommodates 169 individuals, three families, the proprietor's included, only survived. The extensive farms of Touchar, Greeness, Overhill and Burnside of Idoch, being entirely desolated, were converted into a sheep-walk by the Errol family to whom they then belonged. The inhabitants of the parish in general were diminished by death to one half, or as some affirm, to one fourth of the preceding number." [5]

Until the year 1709 many farms in the Monquhitter district lay waste [5] and even at that time the landlord found great difficulty in getting tenants. It was also said by some eighteenth century writers that the Seven Ill Years led to wholesale depopulation of many other interfluvial tracts of the low Buchan plateau. At that time most of this land was still moss and moor, but it retained in places the marks of the plough. Anderson, for instance, maintained that the famines had extinguished the farming population in such places,[6] but more probably these marks were the remnants of cultivation at a much earlier period when most of the fertile valley lands were covered with forest, and the arable land was, of necessity, on the interfluves. According to one source, the only considerable extent of arable land which was deserted and never repeopled as a result of the Seven Ill Years was in the Glens of the Foudland Hills in western Aberdeenshire. Here the inhabitants were completely destroyed by the famine.[7]

The depopulation also had an effect on the price of land. It was said, for instance, that " from 1700 till 1730, the medium price of lands sold in the county of Aberdeen did not exceed sixteen years purchase of the then low rents." [8] The only positive improvement to emerge from these years of distress was the introduction of the potato into Scotland, which is believed to have occurred at the beginning of the eighteenth century. The writer of the Monquhitter account ascribed the introduction of the potato into the North East to " one Morrison, (who) driven from his home by famine, lived for some years in Ireland, but returned to his country with the good seasons, and brought along with him a few potatoes, which he taught the neighbouring gentlemen to cultivate." [9]

As in the Bengal famine in 1944 when the inhabitants of the rural districts converged on Calcutta to seek food, so here a great migration of people began from the upland and interior districts to the small centres of the Lowlands. In the higher parts of Morayshire there was food neither for man nor beast, and the cattle and sheep died off in great numbers. The people flocked first to the churchyard, the one green spot in the countryside, to pull and boil the nettles, and then moved farther afield. In the north of Buchan at Aberdour, one William White was paid 15s. for burying fifteen poor strange people,[3] and in many cases the Kirk Sessions were unable to provide coffins for the numbers who died on their hands. In the parish of Kemnay on Donside, so many died of want that the Kirk had a bier made to carry the bodies of ten poor Highlanders to the grave.[10] So many deaths and so much suffering seem to have hardened the hearts of the more fortunate survivors, for the elders of one Deeside parish complained that " the generality of the people had become so unchristian and unhuman that they would not so much as help to the churchyard with the dead bodies of the poor who were daily dying before them." [11]

There is little doubt that the Seven Ill Years were responsible for the great multitudes of beggars and vagrants who became a menace to the more fertile lowlands of the country. Fletcher of Saltoun estimated that at that time there were two hundred thousand vagrants begging from door to door, of whom about half were families driven to want by poverty and famine.[12] Such large numbers were a great strain on the resources at the disposal of the Church, since these were meagre enough at the best of times, depending on the offerings placed in the poor box.

Famine and food shortages were never very far from the population at the beginning of the eighteenth century. In 1709, while the country was recovering from the effects of the Seven Ill Years, a fast was intimated in the lower Deeside parish of Drumoak on June 5th " for the unseasonableness of the weather, the great loss of flocks and cattell, and many spiritual plagues in all ranks." [13] The next important food shortage was, however, in 1740-41, when the same parish records have the entry : " July 12th ; Fast intimated on account of scarcity and famine and the Spanish War." [13] The winter of 1739-40 had been long and harsh and the bad weather continued into the spring which was marred by a great frost until the end of April. No seed was sown until May, and the growing season was rough and sunless. The crop was stunted, almost useless, and hardly fit to sustain cattle.

Although many deaths were reported in the Highlands, the Church once again stepped into the breach, this time assisted by the landowners. At Peterhead, the Kirk Session bought £5 of meal for its poor[14] ; at Elgin, in 1741, " the Council considering that by reason of the scarcity of victuall has occasioned mobs and tumults whereby the inhabitants are in danger every night . . . the town is to be guarded every night by 20 men in every qr under a Bailie." [15] In Monquhitter parish, which had suffered so severely in the Seven Ill Years, " the utmost misery, though it fell short of death, was felt by the labouring poor." [9] Not only was food short but it was difficult for the labouring

men to get work. The price of meal did not rise exceptionally high, but there was little money to buy it. Once again, migrations and redistribution of the population were the result. It was owing to this famine of the early 1740's that the ancestors of Robert Burns were forced to leave the Mearns and move south in quest of work and livelihood.

After an interval of about twenty-five years with reasonably good harvests and a steady increase in population, another harvest failure occurred in 1767, leading to high prices for meal and food riots in Aberdeen.[16] It was followed a year later by severe flooding as a result of heavy autumnal rains. 1768 had been a good harvest year, and by the 6th of September the harvest had begun over most of the North East. The rivers rose at least three feet higher than in living memory and flooded all the oats and barley on the haughs. Before the agricultural improvements began in the North East, the flood plains or haughlands of the rivers were some of the most fertile and productive parts of the arable land. Of the Don valley, for instance, it was said that " the haughlands of Fintray were very rich grounds, generally made up of a rich loamy soil, but away from the river (up the broad gently sloping valley sides) the soil became much worse, consisting partly of peat moss, and partly of moor interspersed with patches of arable land, some of which has a strong clay soil." [17] These haughlands produced the greater part of the crop of the valley townships, which in themselves were more productive than the farms on the low interfluves. At Fintray, the floods of 1768 swept away most of the crop between reaping and stacking,[18] and many farmers at Monymusk further upstream were ruined by the washing away of the cut corn.[19] These floods were recorded on every river of the North East, and turned a year of recovery into another year of food shortage.

For the next fourteen years the harvests were unequal. In 1771, for instance, a severe frost occurred on the 2nd of September, which did a great deal of damage in the western and higher parts of the lowlands. The summer of 1772 was cold and wet, and the harvest in many places was not completed until the middle of November. This had a bad effect on the prospects of 1773. Most of the previous year's crop had to be used as seed and it was not until the new crop was gathered in that there was any relief from the distress.

From 1773 to 1778, the harvests were generally good, but a succession of three bad years led to famine and hardship in 1781. These famines were extremely important and deserve detailed treatment. The year 1778 opened with snow and frost. This continued with little interval until March which, together with April, had tolerably good weather. The next three months were seasonable, but heavy rains in August did a great deal of damage to the crop, especially since there had been little sunshine all the time the grain was filling. The harvest was consequently late and proved defective. In 1779 excessive drought occurred and the sandy soils, such as are often found in the dissected fluvio-glacial valley trains of the North East, were very dry. The corn harvest, however, was reasonably good, but the fodder crop was so short that whins were extensively used as fodder for cattle and

horses. 1780 and 1781 were similar, and the year 1782 opened with less grain than usual in the stackyards.

According to an old diary,[20] 1782 was the most singular year in the eighteenth century. The weather was good until the 11th of March, when there fell a great deepness of snow. Strong winds from the north east drifted the snow the following day and it lay for over a fortnight. Frost and rains followed, and it was only with the greatest difficulty that the sowing of oats could be completed by the end of April. In May it rained violently, sometimes three or four days together, accompanied by high and cold winds. Fodder was unobtainable and cattle in some parts of the country died off in great numbers. One man kept his cattle alive by tearing off the straw with which he had thatched his cottage the previous autumn.

After this the weather turned warm and wet, which brought on the grass, but made it difficult to dry out. The disaster to the grain crop began to occur in August when there came an easterly storm of rain and wind which laid low all the corn just as it was beginning to shoot. Most of it remained flat on the ground in the wet and foggy days which continued until after the equinox. A temporary improvement in the weather was suddenly broken by a heavy frost on the night of the 3rd-4th October which gave the finishing blow to the crop before the harvest. Pease and also the potatoes were similarly affected. The oats were generally harvested about the 15th of October, and by the end of November the remains of the crop were practically all in the yards in the sheltered Vale of Deveron. In the bleaker upland districts it was not all in by Christmas. The finishing touches to this disastrous year were supplied by sixteen days of calm and black frost in the middle of December, which made " all the unwholesome stocks of oats smoke like lime kilns." [21]

Famine stalked abroad once again, but this time heroic efforts were made by the Church and public authorities to prevent great mortality. As in the Seven Ill Years, some parts of the country escaped, especially the lands which lay in the warm pocket about the mouth of the Spey and further west in the Laich of Moray. But in the uplands, such as the high basin of the Cabrach in the Banffshire Hills, the mill multures amounted to only one-ninth of what they were in former years.[22] Even on the lowlands, as at Keith, the yield of grain could not support the farmers above six weeks or at the most, three months.[23] In the parish of Keithall on lower Donside, " several families who would not broadcast poverty lived on two diets of meal a day, and one family wanted food from Friday till Sunday at dinner." [24] The Kirk Session at Peterhead let the grass in the churchyard for the benefit of the poor, and in conjunction with the landowners and government, meal was supplied at prices lower than market rates or free of charge.[14] Some of the food came from " the copious magazines of pease provided by the Navy," a facility made possible by the ending of the American war.[25]

Nevertheless great hardship occurred, and the following year an epidemic of scarlet fever was fatal to many.[10] The food shortage set in train an important sequence of events which materially changed the

appearance of the landscape and at the same time lessened the chances of famine in the future. It provided the stimulus and the time for the changes to occur. In the first place, the improvements which had hitherto been practised by the landowners and a few enlightened farmers came into general use. Some of the old late-ripening varieties of oats and barley were discarded, and root crops and potatoes were cultivated in ever-increasing numbers. Turnips, which had been introduced into the North East about 1760, did not, for instance, come into general use until after the 1782 famine. At the same time the old settlement pattern of farming townships and kirktowns began to disappear and emerge in a new form.

The farming townships appear to have been first broken up into separate farms of varying sizes about 1760, when the majority of the landowners became interested in agricultural improvements. As enclosures became necessary and were established for the growing of root crops and the more scientific cultivation of the soil, the old run-rig system, based on the Scottish openfield system of agriculture, was changed and individual holdings became common. The size of the holdings depended on the whim of the individual landowners. Some let the old townships in large farms, others parcelled out the land into small farms and crofts. After a short interval, this redistribution of holdings was followed by an enlargement in the size of the farms. In some parts of the North East, this seems to have begun about 1755, but in others it is significant that the enlargement began after 1782. Sometimes as many as twenty-four farming settlements were reduced to seven or eight, as happened on the coast south of the River Ythan,[26] and similar conditions were recorded in all the better farming areas. It is impossible, however, to say just how far the famines were responsible for this diminution in the number of farms. Some of the landowners found that the improvements could best be carried out by having large farms with substantial tenants ; in other cases the exhaustion of the peat mosses was an important cause of the changes in holdings. Nevertheless, the great decrease in population which took place as a result of the famines must have been an important factor.

From the evidence of Webster's census of 1755 [27] and certain estimates of population made by the Society for the Propagation of Christian Knowledge about 1771-1775,[28] it is known that the population increased steadily in the first seventy-five years of the eighteenth century. Yet at the time of the Old Statistical Account there had been a great decrease in population compared with 1755. This decrease occurred mainly in the last twenty years of the century and varied in intensity. The greatest decline took place in the more remote and hilly districts and glens of the highlands, while some parts of the lowlands, especially the north of Buchan, actually showed an increase. This, however, was the result of special causes, such as the increase in linen manufactures, the establishment of the new planned villages,[29] and the great colonisation of the interfluvial lands undertaken by the crofters. It is probable that a great many of the colonists were migrants from those districts which had been most severely hit by the famine. Robertson, for instance, mentions that a great number of Highlanders

had migrated to the mossy Kincardineshire Plateau between Stonehaven and Aberdeen partly because of the plentiful fuel supply,[30] but probably because they had been driven from the glens by famine.

Not only was there internal migration from the stricken uplands to the coastal areas and the town of Aberdeen ; there was also a long distance migration to the manufacturing and agricultural districts of the Central Lowlands in the hope of finding employment. Others went even further afield, and there is mention of emigration to America at this period. As in the famines of the Seven Ill Years, the disaster was followed by extensive migration and movement of peoples. Those people who were left behind sometimes benefited from the decrease in population. Shortage of labour supply led to higher wages for farm servants, and the farmers themselves benefited because it now became the object of the landowners to encourage those who remained by granting long leases, instead of the seven- or nine-year leases granted previously. Sometimes the leases granted were not merely for the lifetime of the tenant but for a period of one or two lives after his own. It is said that some of the leases granted after 1782 had not finally expired in 1860. The effect was to give continuity in farming practice, pride in the land, and greater attention to costly but necessary improvements, such as draining, liming, dyking and the reclamation of moss and moor. A five-year lease had been little encouragement to spending money and labour when there was no certainty that removal would not follow at the end of the period.

The eighteenth century closed with another shortage of provisions in the years 1799 and 1800 ; on Sunday 21st December 1800, a proclamation was read in all parish churches by the King's Authority that all persons should abridge a part of their normal allowance ; what was formerly the allowance of three persons should now supply four ; that all pleasure horses should be supplied with hay and not corn. It was a fitting close to a century which had seen such a variety of harvests and so many geographical and social changes.

This is not merely a factual account of the famines in a small area over a century of time. It indicates that we must pay great attention to fundamental geographical controls, such as climate and its infinite local variations, in the study of the past geography of Scotland. This will necessitate a more detailed knowledge of distributions ; at present there are few quantitative data as to the variation of frost intensity which could throw important light on agricultural distributions both past and present. From another point of view, as has been pointed out by Sir John Russell, such a study indicates how the problem of food shortage was overcome in the past by the development of scientific farming methods adapted to the local environment. Such knowledge will enable the problems of famine to be investigated and help towards the solution of food-supply difficulties in those areas of the world where climate and food shortage are still closely interlinked.

Paper read before Section E of the British Association. Edinburgh 1951.

REFERENCES

[1] *E.g.*, Renner, G. T., Jr. A Famine Zone in Africa : The Sudan. *Geographical Review*, 1926, 16(*4*) : 583-596. 9 figs.

[2] Old Statistical Account. Drumoak. 3 (*47*) : 317.

[3] *Transactions of the Banffshire Field Club*, 1932-1935, p. 50.

[4] Quoted in : Alexander, W. M. Northern Rural Life in the Eighteenth Century. P. 43. Edinburgh, 1877.

[5] O.S.A. Monquhitter. 6 (*18*) : 132.

[6] Anderson, J. The Agriculture of Aberdeenshire. Edinburgh, 1794. O.S.A. Lumphanan. 6 (*4*) : 384.

[7] Keith, G. S. A General View of the Agriculture of Aberdeenshire. P. 150. Aberdeen, 1811.

[8] Douglas, F. A General Description of the East Coast of Scotland. Edinburgh, 1782.

[9] O.S.A. Monquhitter. *Op. cit.*, p. 133.

[10] O.S.A. Keithall and Kinkell. 2 (*47*) : 528.

[11] Henderson, J. A. Annals of Lower Deeside. P. 96. Aberdeen, 1892.

[12] Fletcher of Saltoun. Quoted by Sir Walter Scott in *Guy Mannering*, Chap. 7.

[13] Henderson, J. A. *Op cit.*, p. 97.

[14] Findlay, J. T. A History of Peterhead. P. 197. Aberdeen, 1933.

[15] *Transactions of the Banffshire Field Club*, 1932-1935, p. 58.

[16] New Statistical Account. Aberdeen. 12 : p. 24.

[17] O.S.A. Fintray. 3 (*29*) : 236.

[18] O.S.A. Fintray. 12 : p. 168.

[19] O.S.A. Monymusk. 3 (*5*) : 70.

[20] Allardise, J. *See* Barclay, W. A Northern Diary. *Transactions of the Banffshire Field Club*, 1930, pp. 31-118. (From this old farming diary the information on weather and farming has been gathered.)

[21] Allardise, J. *Ibid.*, p. 41.

[22] O.S.A. Cabrach. 7 (*36*) : 367.

[23] O.S.A. Keith. 5 (*29*) : 428.

[24] O.S.A. Keithall and Kinkell. 2 (*47*) : 529.

[25] O.S.A. Monquhitter. *Op. cit.*, p. 134.

[26] O.S.A. Foveran. 6 (*8*) : 66.

[27] Figures for the various parishes are given in the O.S.A., Vol. 20.

[28] S.P.C.K. Records, Vol. 60. Register House, Edinburgh.

[29] Houston, J. M. Village Planning in Scotland, 1745-1845. *The Advancement of Science*, 1948, 5 (*181*) : 129.

[30] Robertson, G. A General View of the Agriculture of Kincardineshire. P. 86. London, 1807.

CO-OPERATIVE RESEARCH ON SOUTH EAST SCOTLAND: THE NEXT STEP?

By A. G. Ogilvie

In 1937 *The Scottish Geographical Magazine* published an address I gave to the Geographical Association, Edinburgh Branch, entitled "Our Ignorance of Scotland: With Some Suggestions."[1] I was inviting geographers and others to remedy defects in our knowledge by their observations on the ground or otherwise, and I propose to begin by reverting to some of the subjects mentioned fourteen years ago which still represent virgin fields or nearly so; but in this case with particular reference to the south eastern part of the country, and again I hope to indicate how the work may be shared by many people, each contributing a little.

I referred to the changes in the coast by erosion and accumulation and the need for systematic observation, not only of the kind that the engineers have to make occasionally with a view to supposedly remedial measures, but more or less continuously so that we may discover the speed with which detritus is moved on, off and along, the shore under the varying conditions of waves and tides. This would mean co-operation by residents all along the coast, which might well be inspired by a small number of people who are able to interest them and to plan in detail the observations to be made at such locality.

In the previous address, and again in the hand-book[2] prepared for the meeting in Edinburgh of the British Association, I have drawn attention to our very partial knowledge of the rivers. Moreover, on the occasion of the floods on the rivers draining the Lammermuir, in August 1948,[3] it became quite clear that there is no branch of our administration responsible for study of rivers and supervision of their activities as a whole.[4] This I consider a deplorable defect in our national and local system of government, which I hope will be remedied. Meanwhile, all geographers are interested in rivers as phenomena, so I propose that we make it our business to study the individual character of each river and its tributaries in a systematic way. In the first place, an attempt should be made to compile a record of floods and their effects throughout the basin, for, while this is unlikely generally to be very accurate, it may point the way for the collection of subsequent data. It may also reveal a degree of local interest in regular watching and recording of rise and fall which could be reviewed in relation to rainfall and snow-melting. Thus in default of a proper gauging of streams we might hope to gain a fair knowledge of the regimes. But, as in the case of the shore line, the project involves the goodwill of many people who could not be asked to give much of their time, as well as supervision by a small number who would have to visit at intervals. These supervisors might also make or collect observations on the calibre of detritus moved by rivers during spates. If such data could be amassed from a number of basins varied in slope and surface cover, it would seem that we should have gone some way in the study of river

nourishment as part of the total movement of water above or beneath the surface, from the time of precipitation onwards. The Germans have a useful term, *Wasserhaushalt*, which may mean simply river regimen but also connotes, more generally, the whole water economy, from precipitation onwards and including the accumulation and movement of water in and below the soil.

This leads to the question of our ignorance of local climate in detail. When I alluded to this in 1937, I mentioned the snow cover as the aspect upon which we had least information. But soon after, the Society for Study of Snow and Ice was founded, now the British Glaciological Society, with a number of well-placed resident observers to report on the altitude of lying snow. This suggests that the Royal Meteorological Society might be able to promote co-operative study of other aspects of local climate. So far I have not suggested research requiring the use of instruments ; but such work is of little help where the atmosphere is concerned. Thermometers with wet and dry bulbs, however, are comparatively cheap, and I think it would be reasonable to hope for some official promotion of a campaign of temperature reading throughout our region. Experts would easily select the best sites to get the most typical results with the most economic use of instruments, the choice of course being affected by the presence of suitable and willing observers. But I suggest that, in general, the observations be made at or near ground-level and at certain places also near tree-top height. The whole subject of the study both of local climate and of micro-climate should be threshed out as soon as possible in relation to this region.

I turn now to the geography of man, and here it is satisfactory to note that since my earlier address many gatherers of information have arisen. First, there was the survey and report on the planning of this region by Sir Frank Mears[5]; next, the institution of the Planning Division of the Department of Health for Scotland, and the appointment of planning staffs by several of the Local Authorities. The launching of the Third Statistical Account, too, has been marked by the allocation of two of the four pilot volumes to this region, dealing respectively with Fife and East Lothian, while the preparation of parish-accounts proceeds elsewhere as well. Furthermore, the Universities, with financial encouragement, have developed research on the social sciences, and both St Andrews and Edinburgh are making enquiries relating to parts of this region. It is satisfactory that at last a new census has been taken, but it remains to be seen whether all the defects of older reports for study of detailed geographical distributions will be made good. The University of Edinburgh, again, has inaugurated a School of Scottish Studies to develop research on many aspects of life in Scotland as related to conditions prevailing in the past and, most important, there will be a serious effort to co-ordinate these studies in many fields of learning including geography. The application of geographical method was never of greater importance.

In conclusion I wish to say a few words about research on historical geography. In the main this is a highly specialised study and unsuited to co-operative effort, but there are two aspects of it in which

valuable contributions can be made by people who are not trained in palaeography or other specialism. I mean first, the dating of roads, and secondly, the recording of place-names in the earlier written forms as well as the discovery of any names not recorded on the Ordnance Survey plans. While there is much to find out about mediaeval routes, this I think should be left mainly to people accustomed to historical research. But most of our roads belong to the eighteenth and nineteenth centuries, and to put dates upon each of the more important of these should be largely a matter of time and trouble spent in libraries. This should be true at least in regard to the turnpike and later roads. Yet it is well worth doing if we are to appreciate the remaking of the countryside during the last 200 years ; and it would be quickly done if enough people would devote themselves to it.

This Society has recently revived its Place-Names Committee, which hopes to institute a systematic record of place-names in Scotland by applying the method long used by the English Place-Names Society. The basic work has to be done in the libraries and the Record Office, finding and copying each name on a separate slip, evidently laborious, but we may hope for some, a labour of love. So the Committee are anxious to discover the people who are willing to give part of their spare time to this task, which is indispensable if this aspect of the national heritage is to be properly appreciated. I should add that the Linguistic Survey inaugurated by the University of Edinburgh is amassing other evidence to be derived from recording the local pronunciation of names, since this often differs widely from the current spelling.

Address introducing the " New Developments in Geography " series of lectures and discussions, delivered in the Society's Rooms, October 11, 1951.

REFERENCES

[1] *S.G.M.*, 1937, 53 (*6*) : 387-394.

[2] Scientific Survey of South-Eastern Scotland. Prepared for the Meeting held in Edinburgh, 8th to 15th August 1951. Edinburgh : Published for the British Association by the Local Executive Committee, 1951.

[3] Learmonth, A. T. A. The Floods of 12th August, 1948, in South-East Scotland. *S.G.M.*, 1950, 66 (3-4) : 147-153.

[4] This statement, strictly, is incorrect, but the Inland Water Survey, for which the Department of Agriculture is responsible in Scotland, has been concerned so far with only a small number of rivers.

[5] Mears, Sir F. C. Regional Survey and Plan for Central and South East Scotland. Edinburgh : Central and South East Scotland Regional Planning Advisory Committee, 1949.

THE DEVON VALLEY: PROBLEMS OF LAND USE AND WATER SUPPLY

By D. Ronald Macgregor

Relations between rivers and man are intimate and vital: careless interference with a stream in one part of its course will inevitably react elsewhere, probably to our disadvantage, as current problems of flooding, erosion and silting illustrate only too well; on the other hand, rivers can be of immense service to man who for centuries past has lived beside them, sailed along them and drawn on them for water, food and power. Our attention is focussed too often upon particular river stretches, and it is important to recall that any stream or reach is but part of a sensitive and dynamic system.

Although the River Devon in the Lowlands of Scotland is only a small stream some 28 miles in length and with a catchment area of 75 square miles, it affords interesting illustrations of certain problems connected with the utilisation of natural water supplies.

This river is notable for the contrasts in valley form which exist between source and mouth, such contrasts being occasioned both by the structural complexities of the area and by the pro-glacial diversion of the river which produced the elbow bend so aptly called the Crook of Devon. Rising at a height of about 1800 feet in the Ochil Hills, the Devon flows eastward and then southward for about 10 miles before issuing suddenly from the hills at an altitude of 500 feet; this upper stretch merits the name of Glen Devon, for the river has cut deeply into the easily shattered and weakly compacted volcanic rocks of the hills. The cross-sections of the glens are markedly V-shaped, which is a typical feature of all the Ochil valleys within the Devon catchment area, although almost by way of contradiction it must be noted that prominent terraces of boulder clay provide a common modification. This would appear to be a matter worthy of investigation by glaciologists. The infilling of the valleys with glacial debris—with thicknesses of 100 feet and more in places—has important bearings upon the hydrology, which will be referred to later. While considerable quantities of this material have been removed by post-glacial erosion, this process is relatively insignificant at the present day except in the case of the River Devon itself. This may be accounted for by the fact that the tributary streams in Glen Devon are still eroding essentially downward; the terraces are well protected by a continuous cover of grass and bracken, and this will only be breached effectively when the terraces are undermined by lateral erosion.

Shortly after leaving the hills, the river reaches the Crook of Devon where its direction and character change abruptly. The direction of flow swings from SE to WSW, and leaving behind the Vale of Kinross —into which it flowed in pre-glacial times—the stream plunges into what may be termed the Devon Gorge. For a distance of nearly 3 miles the river is shut in by precipitous and rocky banks which average 50-70 feet in height. The rocks are mainly Carboniferous sandstones and limestones which yield fairly easily to weathering and

erosion, but the course of the river is traversed by faults and igneous intrusions, so that the fairly steep gradient of 1 in 30 is quite irregular and is accounted for by the presence of waterfalls and rapids. Because of its inaccessibility, the gorge has lent itself to no form of human use other than power development which is now negligible.

Perhaps the most striking contrast in the course of the river is to be seen at Vicar's Bridge, where the gorge ends and the Devon Valley proper begins. The valley tract extends due westward for a distance of 9 miles, mostly at an elevation of about 50 feet, and takes the form of a regular trough ; on the north the faulted face of the Ochil Hills rises steeply to over 1000 feet, and on the south there lies a low but none the less distinct bluff composed mainly of Carboniferous sand-

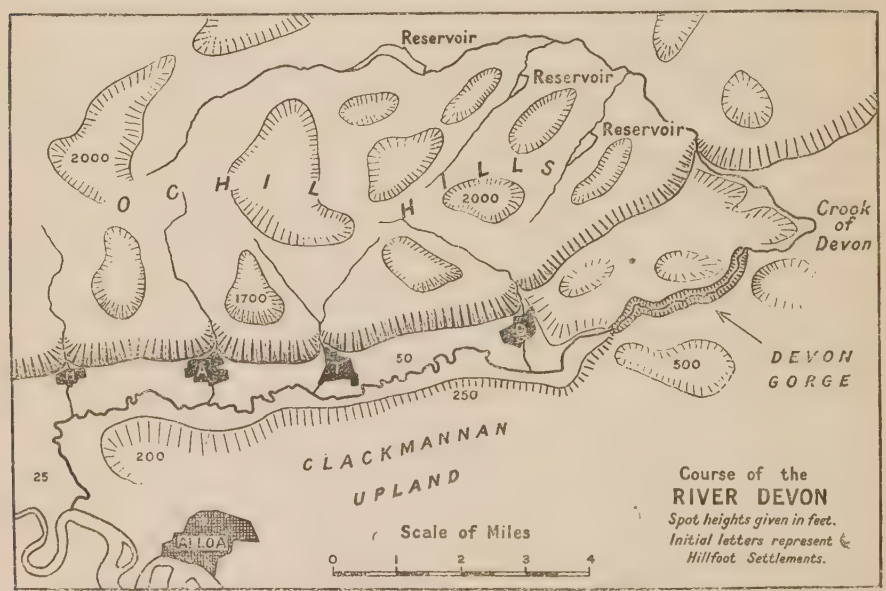

Fig. 1. Course of the River Devon. M=Menstrie. A=Alva. T=Tillicoultry. D=Dollar.

stones. Thus enclosed between volcanic and sedimentary rock masses and with a gradient of only 1 in 500, the Devon Valley is not easily drained and is frequently subject to partial flooding. The level alluvial floor over which the river meanders is interrupted only where gravel fans have accumulated at the exits of the Ochil Hill tributary valleys, and settlement is concentrated notably upon these deltaic dry sites. As opposed to the absence of tributaries of any significance on the south side of the valley, five or six streams—all about 3 miles in length—flow down from the Ochils on the north ; these streams have cut deep glens in the hills which narrow to spectacular gorges along the bold line of the scarp edge. The rapid rush of water from these tributaries rather aggravates the drainage problem in the Devon Valley, but these same streams are the very life-blood of the hillfoot settlements : they meet the domestic requirements of the valley population and by virtue

of their pure, soft water have played a vital part in the establishment of the traditional textile industry ; in the past they supplied power to the mills, and this function still exists, although only to a very small degree.

It is important to record two facts in relation to these tributary streams : firstly, despite the steep gradient of the tributaries (Alva Burn, 1 in 10) comparatively little sediment is brought down, this being accounted for both by the rich vegetative cover on the hills and the fact that in their lower reaches the streams are cutting deeply into rock ; and secondly, probably because of the sponge-like effect of the boulder clay infilling the upper parts of the valleys and plastering the sides of the glens, the flow in these small streams or burns is remarkably maintained throughout the year. The mean annual rainfall on the hills is about 50 inches, possibly 60 inches in the few localities which rise to 2000 feet, and this amount would appear to be somewhat inadequate in view of the steepness of the hill-sides and the considerable evaporation—as much as 10 inches in the year—which must be taken into account : tributaries to both the upper and lower reaches of the Devon rise quickly, but particularly is this true of those draining the steep, southern slopes of the Ochils. Within five or six hours of the commencement of heavy rain the hillfoot burns are in spate and the lowering bluffs of the scarp face are streaked and flecked with white ribbons of falling water, but in spite of this display, prolonged rain fails to produce a proportionate rise in the level of the burns. Thus the Ochil streams possess a natural storage system which maintains a flow of water throughout the year, and even in the generally dry months of April, May and June there is enough to meet the present needs of the towns in the Devon Valley.

SW of Menstrie the Devon Valley merges into the Carse of Forth and, indeed, the valley as far upstream as Tillicoultry is but an extension of this alluvial plain. In its last few miles over this area the river flows southward to join the River Forth between Alloa and Stirling, and at its end the River Devon is actually further westward than at its source. Few of our rivers follow a more devious course in their efforts to reach the sea and as ineffectively too : in addition, the Devon suffers a damming back effect when the Forth is running high, and the prevailing westerly winds which sweep up the Devon Valley possess the power to pond up the water at some points along the lower reaches of the river, thus promoting flood conditions still further. A term which figures in most writings on the agriculture of the area is " Lammas floods," and it is unfortunate that strong westerly winds should predominate in the critical harvest weeks between mid-August and mid-October when as a result of periodic falls of heavy rain the river is invariably running high.

The River Devon must have changed considerably since the time that Robert Burns wrote in praise of it. The riversides had been only partly drained and enclosed, and the main roadway along the Hillfoots lay from 50 to 100 feet higher than the present main road. The river was then probably fairly free from pollution, although coal digging had been commenced on the south bank at least as early as

1700, but the lower Devon is now badly polluted by mining waste and industrial effluents. The degree of pollution is not excessive, however, and with the help of the National Coal Board and assuming no radical change in the character of the Devonside industries, the Devon may possibly become somewhat cleaner in its lower reaches. Certainly there is less water flowing downstream than a century ago, and this mainly as a result of the need to divert water to supply the industrial and mining population of Fife. Three reservoirs have been constructed in the Glen Devon area, all of which help to supply the population of Fife ; they have a total capacity of 1400 million gallons and tap 30 per cent. of the total catchment area upstream from Dollar. The construction now in progress of a fourth reservoir will increase the total storage capacity to 2500 million gallons, but it will not alter the extent of the total catchment area. The volume of compensation water which the reservoir authorities are required by law to release is approximately 1800 million gallons yearly, and it may be reckoned that the average volume of water flowing down Glen Devon

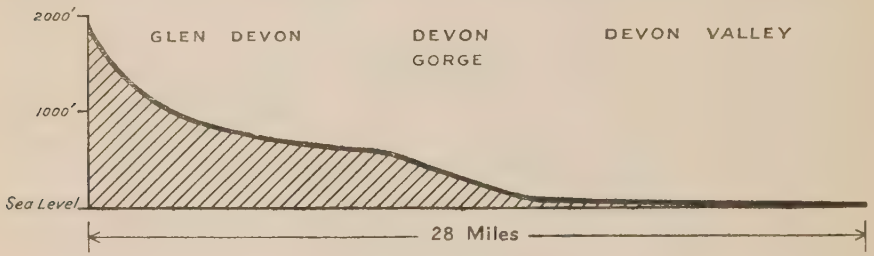

Fig. 2. Profile of the River Devon.

has been reduced by 28 per cent. since about 1900. Such a change has of course its implications for other parts of the valley.

In comparison with this recent utilisation of water resources in sparsely populated Glen Devon, the tributary streams of the Devon Valley have been utilised since the fifteenth century. These north bank burns were the very basis of life and work, and the purity and softness of the water which were valuable to the pre-industrial woollen industry constitute even to-day a factor of considerable importance. Other factors—skilled labour, factory space, low rents and the ready availability of coal—have also contributed to the growth of a population with a density of 1000 persons per square mile in the valley tract, so that the supply of water from the hillfoot burns is now intensively utilised. In Tillicoultry for example, after the general and domestic needs of the burgh have been met, supplies are needed for four textile mills, a tannery, a paper works and an aerated waters plant. In Alva the extraordinary position exists of industrial water rights taking precedence by law over the rights of the burgh.

The mention of water rights suggests competition for limited supplies, and such is indeed now the case. Alva and Tillicoultry have both increased by 1000 per cent. since about 1750 ; the population of Clackmannanshire, totalling 37,500 persons—an increase of

17 per cent. on the figure for 1931—together with important mining, textile, brewing and paper industries, is dependent for water upon relatively small streams and deep wells. If the entire valley of the River Devon had lain within Clackmannanshire the situation might now be very different, but the catchment area upstream from Dollar lies either in Kinross-shire or Perthshire, and as already stated, 30 per cent. of this area is tapped by reservoirs belonging to Fife authorities.

The chief and most urgent problem is that of finding an adequate water supply. The latest report of the Clackmannan County Council speaks of a deficiency of 1,500,000 gallons daily ; such a deficiency is not so immediately critical as it would appear, for it represents cover against possible periods of drought and allows for the expected increase of population in accordance with the planned migration of miners from Lanarkshire. Nevertheless, at the present time the only burgh with a fully adequate water supply is Dollar, and the County Council have been obliged to augment their supply temporarily by overland pumping from Dunblane. The long-term plan is that the county and burghs of Clackmannan should co-operate with Perthshire in a regional scheme that involves drawing water from Loch Turret, which lies some 20 miles north of Alloa on the other side of the Ochil Hills.

The question arises as to whether it would not be prudent and economic to utilise the hillfoot burns to a fuller extent, particularly in respect of the small burghs of Alva and Tillicoultry whose interests might tend to be neglected in a regional scheme. At present very little provision exists in the Alva and Tillicoultry Glens for the storage of water, and in fact neither town has more than two days' storage capacity ; this is a fair measure of the dependability of the streams, which have a summer minimum flow of 3-400,000 gallons daily and an average winter flow of over 1,500,000 gallons daily. The present daily rate of consumption in both towns is not above 300,000 gallons, and it would appear, therefore, that adequate supplies of water are available and that the problem is reduced to one of storage. In this respect the hillfoot glens seem at first sight to be eminently suitable, for there are many points near their exits at which narrow dams might be sited ; more detailed investigation reveals, however, that the volcanic rock tends to shatter easily and is frequently weakened by intersecting faults and joint planes, so that even if it were possible to find firm foundations for a dam, the probability is that the reservoir would quickly fill with gravel scree. Then again it will be remembered that the gradient of the glens is 1 in 10, which means that the height of any dam would be unusually costly as compared with the volume of water to be stored ; for example, whereas the Glendevon Reservoir holds approximately 13,000 gallons of water per unit of dam wall, the equivalent figure calculated by the writer for a reservoir (capacity 150 million gallons or one-sixth that of Glendevon) in Alva Glen is only 1500 gallons. But storage for the towns of Alva and Tillicoultry should be reckoned in terms consistent with their respective requirements, and the possible construction of small reservoirs seems therefore to merit consideration—reservoirs with a capacity of not

more than 5-7 million gallons and holding a reserve equal to three weeks' requirements, an adequate safeguard surely in view of the constant flow of the streams throughout the year. Such reservoirs in the Ochil glens would help to alleviate flooding in the valley, and, conversely, the introduction of additional water supplies from Loch Turret will mean an increase in the water being poured into the Devon, consequently aggravating the drainage problem during wet periods of the year. Advocates of participation in the " Turret Scheme " are hopeful of attracting further industry to Alva and Tillicoultry, but they would do well to think again. These two burghs are unique in type and character, they house varied and skilled industries employing a good type of worker, and they possess a physical compactness which has been the foundation of a healthy community spirit. Complaints voiced to the writer regarding advance elements of immigrant labour may predict future social problems in the Devon Valley, and the burgh authorities might therefore be well advised to consolidate rather than expand.

In the early industrial period the Ochil burns were vital as sources of power, many of the present mills still bearing marks of primitive water-wheels, and one wonders whether these streams could not be used to develop hydro-electric power. By and large it would not be an economic undertaking, the amount of water available being small, but in certain cases it may be practicable, as in the Strude Mill at Alva, where a small, independent hydro-electric plant helps to start up the spindles in cold weather and safeguards a valuable dyeing process against damage in the event of power cuts.

Consideration having been given to the tributary streams, attention must now be focussed upon the River Devon in its meandering course through the valley tract. Between Dollar and Menstrie, below the break of slope along the margins of the valley floor, lies an area amounting to 3700 acres. This ground consists mainly of a fertile, sandy loam which drains quickly and easily provided that the water is permitted to escape. The river meanders across this level flood plain in typically mature fashion : ox-bow lakes, loops, bends and stretches of abandoned river bed are all common features, significant evidence in themselves of the power of the stream to erode laterally, a process which is particularly damaging in periods of flood.

Land Use in the Devon Valley

Classification	*Description*	*Acreage*	*Percentage*
A+	First class land free from flooding	1230	33
A	First class land liable to flooding	630	17
B	Land with water lying periodically	560	15
C	Land in course of degeneration	270	7
D	Marsh and rough land	110	3
—	Urban and industrial	940	25

But before considering the problems let us examine the actual condition of the land in this area. Of the 3700 acres, one quarter is occupied by human dwellings, factories, mines and dumps of different sorts ; a high proportion this but perhaps not unduly so since industries

in the area are active and varied. The apparent fact that 75 per cent. of the area is farmed, however, is misleading and the above Table provides a basis for correction: 10 per cent. consists of marsh or land in an advanced state of degeneration which is overgrown with reeds and coarse grasses ; 15 per cent. is subject to inundation for a period of up to three months in each year and is thus restricted in its usefulness. The remaining 50 per cent. is that proportion which can be put to maximum agricultural use, although parts of this are liable to be flooded, and it is this very land which is most likely to be selected for any future expansion of building and industry. The utilisation of the Devon Valley must be considered in relation to the condition and needs of adjacent areas : set between the uncultivable Ochils to the north and the somewhat infertile upland of Clackmannan to the south, and with mining subsidence threatening considerable areas of the rich Carse of Forth, the fertile Devon Valley ought surely to be guaranteed to farming and set to produce intensively to help meet the needs of the increasing nearby population in Tullibody and Alloa. Such an administrative measure would constitute but a beginning, for the problems of flooding and erosion remain to be dealt with.

As compared with present conditions, floods were more frequent and their effects probably more prolonged prior to 1800, and at a later date the New Statistical Account mentions the damaging effects of flooding on crops and communications. Regulation measures continued during the first half of the nineteenth century were the construction of embankments, the sinking of drains and the excavation of ditches up to 8 feet in depth—drains are not altogether successful in this ground, for they tend to be choked by the fine alluvium, but deep ditches seem to be very effective if kept clear of tangled undergrowth. In some parts, flood deposition has raised the centre of the valley floor slightly above the margins, and in such cases the deep ditches are vital channels through the intervening barrier. But irrespective of whether ditches or drains are in use, it is obviously fundamental that the river bed be prevented from building up above the general level of the valley floor, and toward this end the lower reaches of the Devon have from time to time been dredged and the extracted material used to construct embankments. Dredging has taken place downstream from Tillicoultry within the last ten years, with the unhappy consequence that lateral erosion upstream of Tillicoultry has been accelerated and valuable land (classes A and B) is being cut away in great slices ; this in turn means that deposition and build-up of the river bed lower down is again in full operation. Lateral erosion such as has just been mentioned is naturally most effective when the river is running high, and it is on these occasions that the drain outlets are dislodged and choked and waterlogging in the fields begins. It has been noted already that comparatively little alluvium is carried into the Devon by the hill burns, and it follows therefore that silting and blockage are effected mainly by material caught up actually within the course of the river through the valley tract.

Measures to control the River Devon and to protect the valuable land along its lower course are of both a short-term and a long-term

nature. In respect of the former the immediate need is for protective works at points subject to acute erosional attack ; bridges and stretches along the railway are included in this category and the cost is high at £1000 per 100 yards. Long-term measures would seem to call for great care in any future dredging operations and for a reduction in the volume of water flowing downstream. This last measure is probably the most vital and the one most likely to achieve success : the Glen Devon reservoirs have already reduced the volume of the river and may do so further as the population of Fife increases. A general and rather naïve impression amongst inhabitants of the Devon Valley is that flooding is caused by the sudden release of water from the reservoirs in order to safeguard the dam walls ; this is hardly the case as

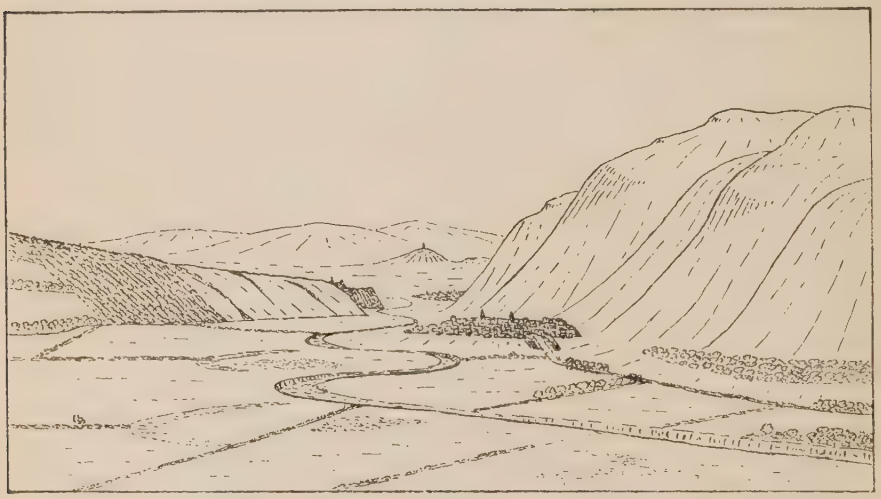

Fig. 3. Sketch of a part of the Devon Valley below Dollar. The Ochil Hills on the right dominate the scene, but the valley is equally sharply bounded by the Carboniferous bluff on the left. In the centre of the sketch the river is seen meandering across the easily eroded flood plain ; other features within the valley are abandoned river bends, the hillfoot settlement of Tillicoultry, and the tip-heap of a coal-mine. In the background lie the Gargunnock Hills, and silhouetted against them is the Abbey Craig on which stands the Wallace Monument.

the very small amounts of waste water released go to prove, and it should be remembered that 70 per cent. of the catchment area upstream from Dollar is not tapped by the reservoirs ; furthermore, this untapped area consists in the main of broken country which produces a quick run-off and is traversed by the Devon Gorge, which has very little power of retention. It is possible that water might be checked in the gorge by a series of dams or by one main dam sited at the once famous Mill of Muckart, and such a dam would compare favourably with the main Glendevon Reservoir in respect of gallons held per unit area of dam wall. There are, however, several objections to such a proposal, and a more economic plan would probably be to reduce or to modify the release of compensation water from the reservoirs. This measure would require intimate agreement between counties, public authorities and landowners and would raise problematic legal issues.

Such then are some of the aspects and problems of the Devon Valley as related to water supplies, but possible major modifications which will result from coal-mining must be mentioned. In 1950, a Court of Inquiry [1] was held to consider an application by the National Coal Board for permission to mine below the Devon Valley between Alva and Tillicoultry, and authority was granted in January, 1952, for the sinking of the new Glenochil Mine from a point about one mile SW of Alva—work in connection with the laying out of the pithead area was in operation by the spring of 1951. It is not proposed here to attempt to discuss the involved issues of the case, but simply to consider certain aspects which are of long term significance and relevant to land use and drainage. An area of 500-600 acres, 70 per cent. of which is at present in classes A and B, will be subjected to permanent flooding on account of subsidence due to mining.[2] Nor is it this area alone which will be affected : in the first place, as sinkage takes place so will erosion upstream quicken, thus destroying more land ; but this may be an intermittent process, for it should cease as each fresh sinkage becomes filled with water ; and yet there may be indirect and prolonged effects upstream, for erosion proceeds headward and will travel very effectively back along such easily eroded banks as those of the Devon. In the second place, the permanent presence of a wide channel of water will pond back subsoil water along the margins, thus inducing degeneration of soil and vegetation. Thirdly, and even further afield, the sheep-farmers on the Ochil Hills will have to find fresh ground on which to winter a proportion of their flocks. It would seem, therefore, that the plan of the National Coal Board threatens to incapacitate more land than that under which it is actually intended to mine.

To some extent the answer to the problem lies in man's ability to control the River Devon and its tributaries within and about the threatened area, for if the river can be confined to a definite channel then at least valuable farmland will not be submerged. Simple diversion of the course of the river is ruled out, for sinkage will take place at one point across the full width of the valley floor, a development which will require measures to prevent the severing of communication by road between Alva and Tillicoultry. Then again it has been suggested that the lower reaches of the river might be deepened to keep pace with the sinkage and thus maintain a natural flow of water through the sunken area ; but this should hardly be practicable since the eventual level of the sunken area will be within 2-3 feet of mean sea-level at the confluence of the Devon and Forth ; such a measure would in any case intensify erosion further up the valley. The plan which might stand the greatest chance of success would involve the embanking of those parts of the River Devon and the Alva Burn which lie within the area of sinkage, the deepening of the drainage ditches on the farms, and the pumping of surplus ground-water from these ditches into the elevated and embanked river channel. Such a plan would save the land for farming in much the same way as is done in Holland, and by preserving a fairly graded condition of the river bed would guard against renewed erosional attack upstream ; the problems arising out of the probable disruption of road communications, gas and

water mains, sewage lines, etc., would of course still remain. The future of the land in the Devon Valley is the future of its people, and one cannot but fear for the destiny of the thriving and prosperous community of Alva. It is the concentrated effect of a number of adverse factors operating over a number of decades which is of real importance, not simply the superficial damage to buildings and installations which will appear in a relatively brief space of time. Reference has been made to the factors which have encouraged industry within the valley, but what of the future which would seem to offer increasing rates, depreciating property, restrictions on building development, and rising costs of transportation as a result of decreased accessibility ?

The general object of this study is perhaps best stated by quoting John Erskine of Mar, who wrote about the River Devon in 1795 : " . . . this report is printed for the purpose of procuring further information . . . and of enabling everyone to contribute his mite to the improvement of the country." There is room for improvement in the Devon Valley ; there is in fact a need to prevent definite and irreparable damage, and any desirable measures should not be restricted by the existence of artificial, administrative boundaries. Finally, here is yet another warning against the frittering away of our natural resources, the most valuable of which is without question our farmed land.

The author wishes to thank the under-mentioned and many others who so readily gave assistance both by discussion and the provision of material. Mr R. M. Dawson, Strude Mills, Alva ; Mr J. C. Donaldson, Town Clerk, Tillicoultry ; Mr J. C. Durrand, Burgh Surveyor, Alva ; Mr R. G. Halley, Town Clerk, Alva ; Mr W. H. Hendry, County Architect, Clackmannan ; Mr C. Huddleston, County Engineer, Fife ; Mr J. E. Kerr, C.B.E., Harviestoun Castle, Dollar ; Mr R. G. Milne, Glenochil Distillery ; Mr D. Ronald, Edinburgh ; Mr D. H. Shaw, Water Engineer, Dunfermline.

[1] The Devon Valley Inquiry. *Colliery Engineering*, 1951, 28 (*328*) : 253-255. 1 fig.

[2] Dott, George. Devon Valley Coal Project. *The Scotsman*, January 9, 1952.

REVIEWS OF BOOKS

EUROPE

Land Potential. By T. W. Evans, B.Sc., Ph.D., F.R.I.C. Foreword by Sir R. George Stapledon. 8×5¼. Pp. 144. London : Faber and Faber Ltd, 1951. *12s 6d.*

Recent events have focussed our attention ever more closely on our once neglected agriculture and the cry, in one form or another, of " increased agricultural output " is frequently heard. Dr Evans' little book is a valuable corrective to the impression that a farm can be treated as a food factory. His thesis is that output cannot be expanded indefinitely without impairing soil fertility, one of our greatest national assets. That is not to say there is no room for improvement, but, while much land is not yielding of its best, some is being overtaxed, while every field should eventually be brought to the optimum level consistent with its potentiality. With arguments that are stimulating—even if open to criticism—and sound ecological thought, especially in the matter of grassland, he builds up to his formula for

assessing the total output of the farm in relation to its potential. This latter should be of special interest to the geographer in his search for a method of calculating overall agricultural output for comparative purposes. But the book as a whole deserves to be read by all with an interest in British agriculture. H. P. W.

Portraits of Islands. Edited by EILEEN MOLONY. 8½×5½. Pp. 147. 10 illustrations. London : Dennis Dobson Ltd, 1951. 9*s* 6*d*.

Here is a collection of a dozen portraits of islands, from St Kilda and Iona to Guernsey and the Isle of Wight, by as many authors. There is no uniform plan : each author chooses his own line of approach, and so none is exhaustive and each gives a pleasant picture of some characteristic aspect of generally well known islands. Most of the articles dwell on the bird life, but some recall the historical setting and others the scenic features. The book is not a guide-book or even a collection of informative chapters, but a series of charming pictures of pleasant places. Some of the illustrations are excellent. R. N. R. B.

Orkney. By HUGH MARWICK. 8½×5½. Pp. viii+287. 49 illustrations. Sketch map. [The County Books.] London : Robert Hale Ltd, 1951. 15*s*.

A scholarly work was expected from the pen of Dr Marwick and we are not disappointed. A native of Orkney and an authority on the ancient Norn tongue, it was only natural that his interest in place-names should lead him to a study of the history of Orkney. This has been written of elsewhere, and at length, but nowhere has a sense of continuity between past and present, between environment and the course of man's actions been better developed than it has in this book. Out walking in the Isles, Dr Marwick sees not only the modern poultry farmer but the Jacobite ferry-louper, the Norse settler and the Celtic priest, and he communicates to us more than a little of his sense of our land, its buildings, its names—and indeed, ourselves—being a product of our past and yet one with it.

While Orcadians will thus wish to read the book, visitors will also find it indispensable in understanding the ethos of the islands, for it is a guide-book in the sense of providing an introduction to the special features which give Orkney its character and charm. R. M.

The Scottish Scene. Photographs by ALFRED FURNESS. Text by JOHN L. WEIR. 11×8½. Frontispiece. 105 plates. Pp. lvi. [Immortal Britain, No. 2.] London : George Allen and Unwin Ltd, 1951. 30*s*.

This book—printed in Holland—contains very fine photographs, many of a high order, although the technique of imparting a misty effect has perhaps been overdone. The selection scarcely seems to justify the comprehensive title : for instance, neither the Western Highlands and Islands nor typical Mid-Lowland scenes are included. The regional divisions within the work—some of which are charmingly portrayed—give a somewhat better idea of its scope : the Burns Country, Glasgow, the Scott Country, Edinburgh, and the Central Highlands. Each of these sections has a commentary, rich in literary and historical allusions but without geographical pretensions. A. T. A. L.

Undiscovered Scotland. By W. H. MURRAY. 8½×5½. Pp. vii+232. 24 illustrations. 13 maps and diagrams. End-paper maps. London : J. M. Dent and Sons Ltd, 1951. 18*s*.

Mr Murray is acknowledged as one of the foremost of present-day Scottish mountaineers, and it is good to know that he finds as much fascination in the traverse of the Moor of Rannoch as in the ascent of a difficult route on Buchaille Etive which overlooks the moor. The book derives the title from the fact that the author not only finds an infinite variety of new expeditions and routes in the Highlands, but the varying seasons and conditions transform the mountains so that they are never the same on any two occasions. As is to be expected, the author describes in a graphic manner many difficult rock and snow climbs, many of which are new ascents. We should like to make one correction : contrary to a widespread belief, the last McCook of Benalder Cottage died peacefully in retirement in Newtonmore. The illustrations are exceptionally good. A. H.

Highland Welcome. By A. A. Thomson. 8½×5½. Pp. 318. 15 photographs. Index. London : Herbert Jenkins Ltd, 1951. 16*s*.

This is a very readable and discursive account of a ten-day tour. The author knows the Highlands, past and present, and is appreciative rather than critical. He provides a good deal of interesting topographical and historical information, but is concerned with people as well as places, the present as well as the past, and has sensible and up-to-the-moment comments on current developments : hydro-electric schemes, Forest Parks, the Iona Community, and the Great Glen Cattle Ranch. The photographs are excellent.

The light touch becomes at times a laboured facetiousness, and there are too many clichés. There are also several slips which should be corrected in a second edition. The Book of the Dean of Lismore (p. 123) contains no poems in English. Flora Macdonald (pp. 182-3) first met Prince Charles Edward, not in Benbecula, but in South Uist. She did not spend all her married life in Skye, she was in North Carolina from 1774 to 1779. Saint Kiernan (p. 162) should be St Ciaran. Loch Greshorisk (p. 186) should be Loch Greshornish. The spelling and meaning of Gaelic place-names usually cause difficulties for non-Gaelic writers, and it is so here.

T. M. M.

The Goat-Wife : Portrait of a Village. By Alasdair Alpin MacGregor. 8½×5½. Pp. 319. 45 illustrations. Decorative end-paper map. London : Museum Press Ltd. Revised and enlarged edition, 1951. 16*s*.

This book, first published in 1939 and now revised and enlarged, tells the story of the author's remarkable Aunt Dorothy, who left her home near Ruthwell with a flock of " some fifty goats and kids, a pony, two dogs, six cats, about three score hens, ten ducks, three turkeys, and three guinea-fowl," to take up life in a croft overlooking the shores of the Dornoch Firth. It is a delightful account of life in a Highland parish before two world wars shattered its simplicity. Illustrations from the author's own photographs and the end-paper map show the local topography, but some of the footnotes seem rather superfluous.

I. W. H.

The Skye Scene. By Eric G. Meadows. 9½×7½. Pp. 96. 67 photographs. Sketch map. Edinburgh and London : Oliver and Boyd Ltd, 1951. 18*s*.

The title is justified by the many superb photographs, although Sleat might have received a little more attention. Technical competence and good choice of subject and viewpoint one takes almost for granted ; but there is room for gratitude to the author for his breadth of approach. While the mountain lover cannot complain that the hills have been neglected, the bays and cliffed peninsulas, castles, farms and crofting townships are also captured in a delightful way, and pictures of crofters at work are also included. The captions show commendable feeling for the structure and evolution of the landforms. In the short and pleasing essay which accompanies the photographs the landforms are also ably discussed, and the author again broadens his treatment to say something about the history, traditions and work of the people.

A. T. A. L.

The Island of Staffa. By Donald B. MacCulloch. 7½×5. Pp. 60. 9 illustrations. Edinburgh : The Moray Press, 1951. 3*s* 6*d*.

This admirable little guide to Staffa is an abridged edition of the author's larger work on the same subject. It has been prepared primarily for the guidance of the occasional visitor or the tourist who, weather permitting, lands on the island in the summer months under the skilled supervision of MacBrayne. The fruits of much sympathetic observation and research are compressed within sixty pages, and there are excellent photographs.

R. M. C.

Arran with Camera and Sketchbook. By V. A. Firsoff. 8½×5½. Pp. 230. 49 photographs and 23 line illustrations by the author. London : Robert Hale Ltd, 1951. 18*s*.

A comprehensive book on an " island which likes to be visited." This handsomely illustrated volume is written in large part in the form of descriptive accounts

of the author's extensive rambling over, through and around Arran which he obviously knows and loves. As might be expected from a mountaineer, Mr Firsoff gives adequate treatment to the magnificently photogenic peaks. His cautionary comments on climbing might be emphasised for the ordinary traveller : his delightful phrase " unfriendly stratification " is capable of admonitory extension.

The geological descriptions will be welcomed by those who are interested in the structure of the island. The author writes pleasantly on birds, beasts, and flowers. His line drawings are worthy of special mention : they are charmingly executed. All lovers of Arran will find something of interest and value in this book, and those to whom the island is unknown could not have a more sympathetic and knowledgeable introduction. G. M.

Scientific Survey of South-Eastern Scotland. Edited by C. J. Robertson. Prepared for the Meeting held in Edinburgh 8th to 15th August 1951. $9\frac{3}{4}\times7\frac{1}{4}$. Pp. 207. 39 figs. 3 photographs. Coloured topographical map. Edinburgh : Published for the British Association by the Local Executive Committee, 1951. 15*s*.

This survey covers the peninsula of Fife and the Tweed Basin as well as the Lothians, and is much more ambitious than many of the previous ' hand-books ' of the British Association meetings. Professor Ogilvie has written the introduction on the region and its parts, and later considers the outlook; several members of his staff have contributed sections on population, the changing rural landscape and on communications. The weather, geology, and the influence of man on plant and animal life are briefly considered, but one is rather surprised that the botanists and zoologists had not taken a greater part in this scientific survey. There are chapters on prehistoric settlement, the Roman period, mediaeval and later times, and on the growth of Edinburgh, while agriculture and industry are discussed rather from the point of view of the economist. In general, the geographer will be grateful for this compact and comprehensive study of the south east. H. F.

The Kingdom of Fife and Kinross-shire. Edited by Theo Lang. $7\frac{3}{4}\times5\frac{1}{2}$. Pp. xiii+238. 108 photogravures. Sketch map. [The King's Scotland.] London : Hodder and Stoughton Ltd, 1951. 15*s*.

The editor has done wisely in choosing Fife and Kinross as the subject of the first of the eight volumes which will constitute the series to be known as *The King's Scotland.* This is an entirely new and up-to-date description of Scotland, and we are told that " every city, every village, every loch has been visited in the preparation of this vast survey."

If each of the forthcoming volumes retains, as it surely will, the high standard set by *The Kingdom of Fife*, success of the project is fully assured. It is much more than a mere dictionary of facts. Full justice has been done to the ' kingdom ' : each place of interest is treated as a separate entity, the place-names being arranged alphabetically for easy reference. The descriptions provide pleasant reading, while the illustrations are beautiful and unusual. D. G.

The Gareloch as Military Port No. 1. By Arnold Fleming. $9\frac{1}{2}\times6$. Pp. 28. 6 photographs. 2 sketch maps. Helensburgh : Macneur and Bryden Ltd, 1948. 3*s*.

Part of the author's article in *The S.G.M.* [63 (*1*) : 20-25] is included in these interesting notes on the geography and intimate history of the Gareloch, with reference to the destruction of amenity in the war years. J. H. K.

Lancashire. By Walter Greenwood. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. viii+303. 49 illustrations. Map. [The County Books.] London : Robert Hale Ltd, 1951. 15*s*.

Much of Lancashire is unattractive except to its inhabitants : the industrial towns are the last word in gloom and ugliness, even its sea coast is largely monotonous and unpicturesque, but Mr Greenwood has made it live and even given it some allure. And he has deftly written of the people and their work, and so made Lancashire a county of interest and activity, with an attractive people. There may be omissions : we have no reference to Lancashire universities. But the county is portrayed to us as a living whole in one of the best volumes of this series.

R. N. R. B.

Buckinghamshire. By ALISON UTTLEY. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xxvi+410. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1950. 15*s*.

In her portrayal of landscape and life in Buckinghamshire, Mrs Uttley does not merely transmit her extensive and intimate knowledge of the county and its history. She succeeds in letting the reader share her sympathetic perceptiveness of woodlands, commons and fields, and of people. Readers will be charmed by the author's felicitous manner of presenting her theme. I. E. C.

Cornwall. By ARTHUR L. SALMON. Revised by H. RONALD HICKS. $6\times3\frac{3}{4}$. Pp. xii+183. 60 illustrations. Map. [The Little Guides.] London: Methuen and Co. Ltd, and B. T. Batsford Ltd. Ninth edition, revised, 1950. 7*s* 6*d*.

The steady reissue of this compact and well produced *Little Guide* denotes the continued interest of the more curious among us in the Celtic duchy. The introductory pages prepare the would-be visitor with concise information on every aspect of the landscape and human scene, and the revision of the flora adds to the value of this entirely new edition. The tourist will derive similar satisfaction from the wealth of detail concerning places, which are arranged alphabetically. Recent information relating to the parishes has been incorporated. A. G. M.

Isle of Man. By Canon E. H. STENNING. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xiii+448. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1950. 15*s*.

Written by the Vice-Principal of King William's College, Castletown, this admirable and scholarly account of the geography, natural and human history, sociology and economic conditions of Mann bears the hallmark of intimate knowledge and extensive research. Valuable appendices provide summaries of Manx pre-history and history, flora, place-names, and other information. In the series, this volume is quite outstanding and can be thoroughly recommended to the student, visitor, and general reader. R. B. S.

A History of the Isle of Man. By R. H. KINVIG, M.A. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. 180. 50 figs. Map. [Published under the Auspices of Tynwald by the Manx Museum and Ancient Monuments Trustees.] Liverpool: University Press of Liverpool. Second edition, 1950. 7*s* 6*d*.

Recent discoveries, particularly in the archaeological field, and also political developments, have been incorporated in this new edition of Professor Kinvig's account of the history of the Isle of Man [see *S.G.M.*, 61 (*2*): 61]. Apart from revision of the text, changes have been made in the maps and other illustrations, and in the format of this useful book. J. H. K.

Ireland: Its Physical, Historical, Social and Economic Geography. By T. W. FREEMAN. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xvi+536. 96 figs. 8 plates. 2 folders. London: Methuen and Co. Ltd, 1950. 32*s* 6*d*.

This authoritative account of the geography of Ireland is based on Mr Freeman's own researches, on work conducted in the geography department of Trinity College, Dublin, during the fourteen years in which he had charge of it, and on contributions to the journal *Irish Geography* which he founded and edited.

The book comprises two roughly equal parts. The first deals systematically with the whole island by topics in nine chapters. The second deals with twelve regional subdivisions of the island, methodically treating the structure and landforms, land use, industries, population and sub-regions of each. Inevitably this treatment makes for a good deal of repetition and some loss of readability. The individuality of regions is as likely to be obscured as revealed by multiplying the factual information given about each. The best chapters in the book are undoubtedly those dealing with population, settlement and society, and agriculture. Its weakest feature is its treatment of landforms, where the real difficulties that arise from the paucity of modern geomorphological studies are needlessly aggravated by describing landform features throughout in geological terms of often questionable accuracy and little, if any, morphological relevance. D. L. L.

The Belgian Kempenland. By F. J. MONKHOUSE, M.A. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xiv+252. Frontispiece. 71 figs. [Liverpool Studies in Geography.] Liverpool: University Press of Liverpool, 1949. 17*s* 6*d*.

This is a compact systematic account of the transformation of one of the notable heaths of western Europe into a hive of modern industry, both before and since the exploitation of a deeply buried coalfield. The book opens with two chapters on the physical background, which include all that is essential. Next, the course of agriculture and afforestation is traced, with a clear picture of the changes in land-use throughout the century following 1846. Subsequent chapters are devoted to exploitation of the coalfield, development of industries and of communications, population and settlement. There is also a useful bibliography.

The serial treatment by subjects has an obvious disadvantage. Nevertheless, the book brings together information that is difficult to obtain elsewhere, and it is well written. The liberal supply of admirable maps and diagrams adds greatly to its value. One cannot but regret, however, that it is devoted to the Belgian part of Kempenland alone: by including the Dutch part as well the author would have given still greater satisfaction. A. G. O.

Switzerland. By JOHN RUSSELL. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. viii+152. 96 illustrations. End-paper sketch maps. London: B. T. Batsford Ltd, 1950. 15*s*.

The mountains and lakes of Switzerland, which occupy the foreground of the average visitor's awareness, in this book form the background. The emphasis here is laid on the aesthetic and cultural significance of Swiss towns and villages, on the Switzerland where architect and artist, musician and dramatist, writer and poet, scientist and religious devotee have found expression. The author disclaims an exhaustive treatment of his theme: he lingers in the regions with which he happens to be most familiar.

This study is complementary to the conventional guide-book, and the index of individuals and places discussed in the text, as well as the excellent illustrations, tend to show how much of Switzerland is ignored by the casual tourist. J. H. K.

Calabria. $8\frac{3}{4}\times5\frac{3}{4}$. Firenze: Il Ponte (Rivista mensile di Politica e Letteratura. Edited by Piero Calamandrei), 1950, 6 (*9-10*): 969-1352.

This special issue of the enterprising review *Il Ponte* contains contributions from no less than 44 authors, not including reviewers. The matter is presented in sections, devoted respectively to historical, economic, political, artistic and literary aspects of Calabria. Particularly notable for its geographical vision as well as for its authoritative character as a summary of the agrarian problems of Calabria is the comprehensive paper by Professor M. Rossi-Doria. The general features of the Calabrian landscape are dealt with by Professor G. Isnardi, who is also the author of a chapter on the Associazione per gli interessi del Mezzogiorno. A chapter of special interest to the linguistic geographer is that by Professor G. Rohlfs on the idioms of Calabria. The editor has not been afraid to include in the volume not only papers on the most diverse topics but examples of the most diverse ways of writing. C. J. R.

UNION OF SOVIET SOCIALIST REPUBLICS

The Soviet Union: The Land and its People. By GEORGES JORRÉ. Introduction by A. Perpillou. Translated by E. D. Laborde. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xviii+353. 44 figs. 24 photographs. London: Longmans, Green and Co. Ltd, 1950. 21*s*.

Both for the general public and the student of geography this book forms a valuable addition to the literature in English on the U.S.S.R. In an introduction, Professor Perpillou applies very briefly to the Union his thesis that "a knowledge of the environment in which a civilisation has grown up, of the latter's evolution and present conditions, of its current needs and aspirations, allows one to reach a better understanding of the part it plays in the modern world, because human actions always touch on some aspect of geography."

It is such a knowledge that Professor Jorré provides in twenty-one chapters

divided into four parts, namely, (1) physical setting, (2) expansion of the Russian world since early times, (3) advance from a backward to a revolutionary economic system, and (4) main natural regions. The chapters on physical geography are rather short, but include many valuable features. Moreover, much detail is given in the regional chapters, which are valuable for their descriptions of the diversity of conditions found in the U.S.S.R., and on account of the dynamic way in which economic and social changes are treated. C. P. S.

Beyond the Caspian. By Douglas Carruthers, F.R.G.S., F.Z.S. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xx+290. 6 colour plates. 18 black-and-white plates. Map. Edinburgh and London : Oliver and Boyd Ltd, 1949. 22*s* 6*d*.

In these essays are collected in a quietly skilful and fascinating manner word pictures of the scenery and wild life in Russian Central Asia, from the Amu Darya and the vale of Samarkand to the border of Chinese Turkestan and to the Tien Shan with its flanking ranges, sheltered vales and desert surround. The freshness of the impression gives no hint that the journeys were made many years ago. There are valuable appendices on the distribution of Central Asian sheep and pheasant species, also an extensive bibliography, which enhance the value of the book to the biogeographer. The general reader will enjoy this account by a distinguished naturalist-explorer of ' forbidden ' regions. The illustrations and map are excellent.
C. A. H.

ASIA

Village Development in Palestine during the British Mandate. By Henry Kendall, O.B.E., F.R.I.B.A., M.T.P.I., and K. H. Baruth, A.M.T.P.I. Information on Soil Conditions by S. H. Shaw, N. A. Pharaon, and A. Y. Goor. 10×8. Pp. 84. 16 plans. 42 photographs. Map. London : The Crown Agents for the Colonies, 1949. 10*s* 6*d*.

This study provides factual detail for a number of selected sites, and is valuable as showing some of the specific plans of improvement in village construction and soil conservation undertaken during the British mandate. The quotation of planning schemes in full legal phraseology sometimes gives a stilted air to the book ; and, most unfortunately, having been overtaken by political events, the proposals set down appear unreal and outdated. There are however many very fine photographs of village, and especially of Arab, conditions up to 1948. W. B. F.

The Antique Land. By Diana Shipton. $8\frac{3}{4}\times5\frac{5}{8}$. Pp. 219. 23 plates. End-paper sketch maps. Decorations by Jill Davis. London : Hodder and Stoughton Ltd, 1950. 20*s*.

A well written account of eighteen months' sojourn in Kashgar by the wife of Consul-General Eric Shipton. Various early passages and phrases show a remarkable sensitivity to atmosphere, but towards the end of the book this becomes submerged in apparently interminable hunting and climbing ' parties.' Why chase chikor when the fascinating life of Central Asia at a critical point in history lay open to an obviously keen feminine intuition ? W. K.

AFRICA

Algérie. By Marcel Larnaude. $7\frac{1}{2}\times5\frac{1}{2}$. Pp. 230. 10 figs. 20 photographs. [L'Union Française.] Paris : Éditions Berger-Levrault, 1950. 300 *fr.*

This volume is one of a series edited by Albert Charton and devoted to short descriptive accounts of the various countries of the French Union. It takes us systematically through the principal features of Algeria, beginning with a very brief historical introduction, and then covering—according to plan—the physical regions, ethnography and *genres de vie*, demography, French colonisation, crops, fisheries, minerals and manufactures, ending with a few notes on town life and external trade, and finally drawing attention to some of the main current problems. C. J. R.

O Distrito de Moçâmedes nas Fases da Origem e da Primeira Organização (1485-1859). By MANUEL JÚLIO DE MENDONÇA TORRES. 9×6¼. Pp. 535. 29 plates. Lisboa : Agência Geral das Colónias, 1950.

Mossamedes was discovered and occupied in 1485 during the palmy days of the Portuguese navigators, but its importance as a European settlement dates only from 1849-50, when the so-called ' First and Second Colonies ' were founded by refugees from political persecution in Pernambuco. The greater part of the book is an account, with quotations from contemporary and official documents, and with portraits of many of the personalities engaged, of the trials and tribulations that awaited those hardy pioneers and of their ultimate success. The local motto is " Labor omnia vincit," and to-day the municipal coat-of-arms is emblematic of the elements on which present prosperity depends : agriculture—including flower- and fruit-growing, cotton, sugar, and the fisheries. The detailed study comes down to 1859, and there are short additional notes on the progress made in recent times and especially since 1945. R. T. C.

African Journey. By ANDRÉ SIEGFRIED. Translated from the French by Edward Fitzgerald. 8×5¼. Pp. 159. 5 maps. London : Jonathan Cape Ltd, 1950. 10*s* 6*d*.

This is a series of articles, originally published in *Le Figaro*, on various aspects of Africa, mainly of the Congo and South Africa. The genius of André Siegfried is applied in turn to fundamental topics such as the essential poverty of South Africa apart from her minerals, of the clash of race and colour in the Union and, in the final chapter, on the basic problem of the survival of European culture in the face of pressure from Asia, Africa and even America.

As in his other books, one feels in the presence of one of the great minds of our time. R. M.

AMERICA

The St Lawrence. By HENRY BESTON. 8½×5½. Pp. 272. Illustrated. End-paper maps. [Rivers of America.] Edinburgh and London : William Hodge and Co. Ltd, 1951. 10*s* 6*d*.

Like many Americans who have visited the St Lawrence valley, Mr Henry Beston was deeply impressed by what he saw. The general way of life of French Canada contrasts so violently with the neighbouring American culture that it could scarcely be otherwise. Quebec has become a North American equivalent of the Celtic fringe : in a dim religious light it is often but dimly observed, through eyes much swollen by sentimental dew. In this book romance and picturesqueness are somewhat overstressed.

Neologisms and precious language too frequently obscure the author's close observation and power to express facts in clear, concise journalese. Where it confines itself to narrative, avoiding ' poetic ' prose and philosophy, *The St Lawrence* does convey much of the charm and character of the great river and its valley. A. M.

Pleasure Island : The Book of Jamaica. Edited by ESTHER CHAPMAN. Historical Section by H. P. JACOBS, B.A. Geographical Section by MARY M. CARLEY, B.SC.(ECON.). 8¼×5½. Pp. xvi+316. Illustrated. Kingston, Jamaica : The Arawak Press, 1951. $1.50, or 10*s* 6*d*.

To condense into 316 pages the history, geography, climatology, folklore, natural history, cultural activities, industries, etc., of Jamaica and to present a living picture of the island would seem impossible. Yet the collaborators of *Pleasure Island* have achieved this because they so obviously love Jamaica. For the newcomer to the island or for the tourist who wishes to know more about the island and its people than mere sight-seeing can give, this book is excellent.

With an adequate bibliography and index, *Pleasure Island* only fails in its poor illustrations. J. F. W. H.

OCEANIA

Myths and Legends of Maoriland. By A. W. Reed. 8½×5½. Pp. 230. Illustrated by George Woods and W. Dittmar. London: George Allen and Unwin Ltd, 1951. 15*s*.

Surely the voyages of the Arawa, Taunui and other canoes rank as even better 'history' than the Viking discoveries of Greenland and North America narrated in the sagas. Yet it appears in *Myths and Legends of Maoriland* sandwiched between the mythical and the fabulous. This relegation of what is always regarded as sound history, even though transmitted to us orally through twenty generations of 'tohungas,' is the sole defect in an excellent volume. Moreover, the coming of the Maori to the Land of the Long White Cloud is so well and fully told that the minor oversight of its inclusion is to be welcomed.

This collection of Maori folklore and traditions will be enthusiastically received by all lovers of New Zealand and by many others besides. The illustrations are worthy of the text, and Mr Dittmar's in the Maori style are especially fine.

C. R. V. G.

POLAR REGIONS

North of the Circle. By Frank Illingworth. 8½×5½. Pp. 254. 32 illustrations. Edinburgh, Glasgow and London: William Hodge and Co. Ltd, 1951. 15*s*.

The theme of this lively book would appear to be the habitability of the Arctic and the countering of the old misconceptions of scurvy, starvation and the terror of cold. High latitudes have little danger to offer if reasonable precautions are taken. This book surveys the northward progress of settlement in Europe, America and Asia and gives a vivid picture of life on the border line of civilisation. It covers a vast area, but it does so satisfactorily even if a little superficially in places.

Some of the statements regarding ice and weather demand a little more scientific treatment, but, apart from a few slips in the spelling of names and in dates, there are few mistakes. Pack ice is sea ice and not a collection of 'growlers.' The flat summits of some Arctic peaks are not due to ice action. It is very doubtful if areas of Greenland were under the plough in A.D. 1000. Among the author's authorities he unfortunately quotes from a fantastic book by Jan Welzl on the New Siberian Islands and their inhabitants, who never existed. Greely did not die in Arctic regions, but lived in the United States to a serene old age. When will authors learn that Spitsbergen is spelled with a medial *s*, not a *z*, which is a German, not a Dutch, English, or Norse version? The illustrations are excellent. R. N. R. B.

The White Continent: The Story of Antarctica. By Thomas R. Henry. 8½×5½. Pp. xii+211. 8 illustrations. Map. London: Eyre and Spottiswoode (Publishers) Ltd, 1951. 16*s*.

Very little has been published, at least on this side of the Atlantic, on the work and achievements of the remarkable American Antarctic Expedition to the Ross Sea in 1946-47, known as the Byrd-Cruzen operation. That is a pity, for its discoveries were numerous and striking. But this book, written in a flamboyant style, does little to fill the gap. An expedition of twelve ships including a submarine, many planes and some four thousand men, ought to have accomplished much, and no doubt it did, but this book is woefully deficient in factual detail. It attempts, moreover, to give a general account of the Antarctic and its problems, and in this it scarcely succeeds.

The Ross seal was not lost for twenty years until the Americans rediscovered it, and the sea leopard, although truculent, cannot fairly be described as "one of the most dangerous animals on earth." "Icebugs" for certain diatoms is hardly an acceptable new name. We would like to have heard more about the large area of ice-free land behind the Knox Coast. The map is wholly inadequate. On the whole, the book is quite entertaining but not instructive. R. N. R. B.

CARTOGRAPHY

Imago Mundi, VI. 1949. Edited by Leo Bagrow. $11\frac{1}{2}\times8\frac{1}{2}$. Pp. 110. Text figures. 15 plates. Stockholm : Kartografiska Sällskapet, 1950. London and New York : Henry Stevens, Son and Stiles (Sole Agents for Great Britain and North America).

Imago Mundi is a periodical review of early cartography. Although published in English it is international in character : amongst writers in the present issue are some from Sweden, Germany, the Netherlands, Britain, Italy, and the U.S.A. From about a dozen longer papers, one may cite as examples : one by Miss E. M. T. Campbell on Packe's " Philosophic-Chorographical Chart " of Kent (1743)—an early attempt to render relief realistically, the author of which appears to have realised, long before Hutton or even Werner, that valleys were carved by running water, albeit he thought the water due to the recession of Noah's Deluge ; another, by G. Kish, on " Some Aspects of the Missionary Cartography of Japan during the 16th Century " ; and one by G. R. Crone on John Green, a little known English cartographer of the eighteenth century. There is also a paper by H. R. Wagner dealing with the possible influence on Columbus of the publication of Marco Polo's narrative. Other longer papers deal mostly with cartographers of the sixteenth and early seventeenth centuries. There are many shorter articles, as well as notes, reviews, correspondence, and a bibliography of recent literature. H. A. M.

OCEANOGRAPHY

The Sea Around Us. By Rachel L. Carson. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. vii+230. Drawings by Katherine L. Howe. 1 plate. End-paper charts. Bibliography. London : Staples Press Ltd, 1951. 12*s* 6*d*.

Anyone interested in the sea and its scientific problems should read this book. It stands unique as a lucid exposition of the problems of modern oceanography. Not only is it fresh and accurate, but it is delightfully written and free from unnecessary jargon.

We have few criticisms to offer. A little more might be said about the position and probable nature of ' deeps,' and a map of them would have been useful. Miss Carson notes the newly discovered group of flat-topped summits between Hawaii and Marianas Islands some 800 to 900 fathoms below the surface : they merit some discussion. Perhaps the most noteworthy of recent discoveries is the ' phantom bottom ' or layer of living creatures at several hundred fathoms in the North Pacific and elsewhere : is this due to a layer of plankton associated with temperature variations ? The Antarctic convergence might be more fully noted, and perhaps more might be said about the circulation of the Weddell Sea, which is now well understood. But the book as a whole is excellent and deserves all praise. R. N. R. B.

BIOGEOGRAPHY

The Sea Shore. By C. M. Yonge, D.Sc., F.R.S.E., F.R.S. $8\frac{1}{2}\times5\frac{3}{4}$. Pp. xvi+311. 88 figs. 61 colour photographs. 62 black-and-white photographs. [The New Naturalist, No. 12.] London : William Collins, Sons and Co. Ltd, 1949. 21*s*.

The high standard of *The New Naturalist* series is further enhanced by Professor Yonge's fascinating ecological study of the plants and animals which inhabit our shores. He shows how the various habitat factors result in a zonal grouping of the organic communities, and relates the form, life cycle, and habits of the individual species to their particular dynamic habitat. A brief consideration of the distribution and fluctuation of various species, and of the economic resources of the shore, makes a fitting conclusion. The whole exemplifies vividly the principles inherent in all living communities.

The meticulous attention to detail should satisfy the specialist, and the interesting approach and exposition attract the layman. Of the superb illustrations, special mention must be made of the very beautiful and delicate colour plates which do much to explain that peculiar fascination which the sea shore holds for children and scientists alike. J. T.

BIOGRAPHY

Hugh Robert Mill. An Autobiography. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xii+224. 6 illustrations. London : Longmans, Green and Co. Ltd, 1951. 18*s*.

The Life Interests of a Geographer was the title of this book when it was privately published in America in 1945 as a folio mimeograph, and an edition of a hundred copies was distributed to Mill's friends. Now, with a few misprints corrected, it is available to a wider public. And well it might be, for never was a biography more intimate as regards the author's personal hopes and ambitions, and more appreciative as regards his acquaintances and friends. He sees in his life story several strands, each representing one dominant interest, from boyhood to old age, and in the end all woven together into the picture of his whole life. His marvellous memory was helped by a diary kept from youth onward. Two lines of work stand out. First his devotion to geography with his lifelong studies of mobile water, " rain, snow and rivers, lakes and the great sea " on the surface of the earth ; and, secondly, his exhaustive knowledge of the Antarctic and its explorers. Although he had never been to polar regions, he was recognised as the highest authority on Antarctic regions. His exhaustive Antarctic library was given by him to the Scott Polar Research Institute in Cambridge. Even more valuable are the letters and papers dealing with the Antarctic which are included in the gift. There are several portraits of Mill in the book. Only the incompleteness of the index deserves censure.

R. N. R. B.

Beyond Euphrates : Autobiography 1928-1933. By Freya Stark. $8\frac{3}{4}\times5\frac{5}{8}$. Pp. xvi+341. 52 illustrations. Sketch map by H. W. Hawes. Wood engravings by Reynolds Stone. London : John Murray, 1951. 25*s*.

Covering the period of her first travels in Iraq and Persia, and her work as a journalist on the *Iraq Times*, this continuation of Miss Stark's autobiography is as fascinating and candid a record as its predecessor, *Traveller's Prelude* [see *S.G.M.*, 67 (1) : 62]. This time the story is told chiefly by means of letters written at the time. The reader is amazed at the energy with which, after an exhausting day in a car or on horse- or camel-back, this indefatigable traveller sat down and wrote lengthy and picturesque epistles to her numerous devoted friends, which have now enriched the world's literature. One is constantly delighted by her felicity of expression, and her word-pictures paint the scene better than any photograph. But the book is also finely illustrated from the author's own photographs, and a map enables the reader to follow her astonishing journeys with intelligence and interest.

I. W. H.

EDUCATIONAL

A Food and People Geography. By Amabel Williams-Ellis. $8\times5\frac{1}{2}$. Pp. 63. 4 figs. 21 photographs. London : University of London Press Ltd, 1951. 2*s* 9*d*.

In a well illustrated and interesting way, this little book—published for UNESCO—poses, and suggests answers to, the problems of an increasing population and an inefficient utilisation of food resources. The useful work of UNESCO and the FAO is stressed. The book is very suitable for inclusion in a Social Studies syllabus.

B. B. H.

Our Food and Our Clothes and Some Other Things. By S. Alnwick. $10\times7\frac{1}{2}$. Pp. 96. Drawings. Graphs and sketch maps. London : George G. Harrap and Co. Ltd, 1951. 7*s* 6*d*.

The author of this work is fully justified in calling it a " jolly " book. An astonishing variety of useful and interesting information is given in some forty brief chapters on our food, clothing and " some other things "—including coal. Questions of origin, manufacture, distribution and consumption are discussed in a lively, picturesque fashion with an abundance of appropriate illustrations, no less effective because they are clever and humorous. The book is obviously designed to appeal to intelligent children, but only very dull adult students could fail to enjoy dipping into this fresh and very human presentation of economic geography.

R. T. C.

Europe. By A. R. BARBOUR SIMPSON, M.A., B.SC., F.R.S.E. $7\frac{1}{2}\times5$. Pp. xii+257. 108 figs. London : G. Bell and Sons Ltd, 1950. 5*s* 6*d*.

This is a school text-book for junior and intermediate secondary classes below Leaving Certificate standard. The treatment is broad and unclogged with detail, while statistical matter is usually outside the text in the form of simple diagrams. The book is well laid out and the style easy, but the treatment of the physical background, structure, climate, etc., is rather too sketchy for a balanced regional account. Maps and diagrams are simple and clear, but while the illustrations are well chosen, their printing leaves much to be desired (p. 177) and should be remedied in future editions.

H. P. W.

Roads and Streets. By PATRICK THORNHILL. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. 49. Diagrams and sketches. [The 'Get to Know' Series.] London : Methuen and Co. Ltd, 1951. 2*s*.

Every aspect of the subject is covered : nomenclature, traffic problems, road construction and its history, etc. The matter is set out mainly in the form of a lively and very practical catechism not devoid of humour. Each particular topic is aptly illustrated.

R. T. C.

GENERAL

Nelson's Encyclopaedia. Compiled and edited by H. L. GEE. $8\frac{3}{4}\times5\frac{5}{8}$. Pp. vii+743. 300 line drawings and diagrams. 80 half-tone plates. 16 plates in colour. Edinburgh and London : Thomas Nelson and Sons Ltd, 1951. 25*s*.

The issue of this well produced one-volume encyclopaedia bears testimony to the efficiency of the publishers. The accuracy of the data presented is safeguarded by the expertness of the collaborators. Ably written, the major articles have been planned as 'keys' to the more detailed items.

The editor rightly stresses that the scope of reference and the selection of facts are determined by value-judgments. The latter are symptomatic of present-day England, as may be gleaned from the number of lines allotted, for example, to Football (81), Atom bomb (69), Oxford (58), Jazz (33), Buddhism (20), Peter the Great, Rommel (16 each), Peter Pan, New Guinea (14 each), Glasgow (12), Pacific Ocean, Crystal Palace (11 each), Vasco da Gama, Horst Wessel (5 each), Galton, Mendeleev, Oceanography (nil). Much space could have been gained by reducing the size of the line drawings. However, this new work of reference will be very popular indeed.

J. H. K.

Geography in the Twentieth Century : A Study of Growth, Fields, Techniques, Aims and Trends. Edited by GRIFFITH TAYLOR. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. x+630. 56 figs. New York : Philosophical Library Inc. London : Methuen and Co. Ltd, 1951. 30*s*.

Twenty authors, under the editorship of Professor Griffith Taylor, have contributed twenty-six chapters on various aspects of modern geography. Some chapters are naturally better than others, but on the whole there are few omissions, though the influence of the universities in expanding the scope and defining the limits of geography is not stressed, while that of geographical societies gets ample notice. Little is said about exploration except as regards Antarctica, upon which the editor accepts the prevalent views of structure. As one might expect, the editor has added many new ideas and a few original diagrams, and he gives the layman, if he troubles to read this volume, a wide outlook on geography. The articles are well documented with accessible books and papers. The student of geography will gain much by reading these essays, or parts of them, but whether he will trouble with a volume that does not claim to be a text-book and is generous in the interpretation of the scope of geography is another matter. To the layman, the book shows the value and importance of modern geography. The glossary of geographical terms is the least satisfactory part of the book, but, in excuse, the editor pleads limited space.

R. N. R. B.

The Scope and Methods of Geography and *The Geographical Pivot of History*. By Sir H. J. MACKINDER. Reprinted with an Introduction by E. W. Gilbert. 9½×6. Pp. 44. London : Royal Geographical Society, 1951. 2*s* 6*d*.

The Royal Geographical Society has done a service in reprinting these papers, originally read respectively in 1887 and 1904. It is no small tribute to the author to say that their interest has in no way diminished with the passage of time. Much that is now accepted as an essential part of geographical discipline is stated for the first time in the former paper, and while the latter includes much of contention—being the original statement from which Mackinder developed his well-known *Democratic Ideals and Reality*—its significance is no less apparent at the present day.

D. M.

L'Homme et le Sol. By HENRI PRAT. 9×5½. Pp. 293. 16 figs. 16 plates. [Géographie humaine, 22.] Paris : Librairie Gallimard, 1949. 670 *fr*.

There is a wide range of topics, from the physical nature of the soil to its use and misuse by man, and even to the physiological and psychological relationships involved in a rural community. Treatment is on very broad lines, and in language that will appeal more to the general reader than to the student who desires details on specific aspects of the subject.

W. B. F.

Men against the Desert. By RITCHIE CALDER, C.B.E. 8½×5½. Pp. 186. 15 plates. 13 sketch maps. End-paper maps. London : George Allen and Unwin Ltd, 1951. 12*s* 6*d*.

This book is an account of a journey through desert and semi-arid regions from Algeria, through North Africa to South-west Asia. It is full of vivid impressions and local colour ; the photographs by Kleboe are excellent, but the postage stamp 'maps' are disappointingly crude. The journey was under the auspices of UNESCO and was to be " . . . a tour of desert research stations to find out the kind of work . . . and the variety and scope of the problems they are investigating." Mr Calder is not concerned primarily with description of desert, but rather with possibilities of changing the face of the desert. Obviously, in one slim volume, it is not possible to write a diary of a long journey and discuss, other than superficially, problems of this complexity.

Bearing this in mind, there is very considerable variety within the book. A French station within the Sahara is visited and the chapter suggests the enthusiasm of the research worker. Possibilities of utilising underground water on a large scale in Algeria are outlined, and then follow accounts of Roman and Italian achievements in North Africa. A tour of Sinai is frankly little more than a vivid travel story. Iraq and Persia follow quickly, then comes a most interesting account of what Israel is doing and hopes to achieve by way of irrigation in Negev. The growth of world population must be accompanied by increased food production, and Mr Calder's book indicates the methods of approach to the problems which are already being followed in the case of arid regions.

H. F.

Insects as Human Food : A Chapter of the Ecology of Man. By F. S. BODENHEIMER. 8¼×6. Pp. 352. 47 figs. The Hague: Dr W. Junk, Publishers, 1951. *fl* 10.

The practice of entomophagy or insect-eating, although regarded with aversion and even disgust in Western civilisation, is widespread among primitive people. Insects have been an important source of food supply since ancient times. Even in Europe the use of such food was prevalent, and as recently as 1885 a little book, by V. M. Holt, was published, entitled *Why not eat Insects ?*

The present author deals with the subject most thoroughly, giving a full account of the nutritive value of insects and of the less repulsive insect product, honey, and surveying in great detail the distribution of this form of diet in all quarters of the globe, each continent being reviewed in turn. The book is well produced, and the illustrations are of unusual interest. There is also a bibliography of some twenty pages. The brief table of contents does not by any means compensate for the lack of an index.

D. G.

Les Bretons à l'Aventure : Explorateurs et Colons. By JEAN CHOLEAU. 8×5¼. Pp. 221. 15 figs. Vitre : Unvaniez Arvor, 1950.

As in the Celtic area of Scotland, emigration has for long been an important factor in the life of the Breton people. In this survey of the Breton contribution to exploration and colonisation from the twelfth to the nineteenth century, the need of the Breton to supplement his resources, and his fine seamanship, stand out. Perhaps this book is of greater interest to the historian, yet the detailed accounts of the various ventures, which range from Asia to Algeria and across the Atlantic Ocean, give to the geographer an insight into the processes of colonisation.

A useful bibliography accompanies each chapter, but the maps hardly do justice to the detailed text. J. B. C.

ATLASES AND MAPS

Maly Atlas Geograficzny. By EUGENIUSZ ROMER. 11½×7¾. 12 map sheets. Wroclaw : Ksiaznica-Atlas. Fifteenth edition, 1951. *Zlotys* 4.00.

The maps of this well-established school atlas are well produced and show clearly the essentials of relief and settlements. There are numerous insets, and three pages of the cover are used for maps and plans in black and white. J. H. K.

Maly Atlas Historyczny. By Cz. NANKE, L. PIOTROWICZ, and WŁ. SEMKOWICZ. 11½×7¾. Pp. 12. Wroclaw : Ksiaznica-Atlas, 1951. *Zlotys* 7.20.

The twelve folded maps, with insets, in colour and five maps in black and white constitute a conventional historical atlas authorised for use in Polish schools, in a first edition of 101,000 copies. J. H. K.

Atlas Polski Wspólczesnej. By E. ROMER and J. WASOWICZ. 8¾×7½. Pp. 16. Wroclaw : Ksiaznica-Atlas. Fifth edition, 1951. *Zlotys* 3.60.

Produced in the Cartographical Institute of Wroclaw, this school atlas of Poland contains coloured maps of the topography, geology, soils, minerals, communications, and inland waterways (inset : Vistula delta now and A.D. 1300), with climatic and economic maps on a smaller scale. The paper cover is utilised for black-and-white plans of settlements and for map-diagrams of foreign trade and Polish industrial centres. J. H. K.

The West End of London. 30×16. 1 : 3600. Revised third edition. Edinburgh : C. J. Cousland and Sons Ltd, 1951. *2s 6d.*

The more obvious changes in this excellent pocket plan are the revised street directory and an inset of the 1951 Festival of Britain site. The fold makes for easy reference to both plan and directory, and the price is most reasonable. A. G. M.

Map of Israel—Including Plans of Jaffa–Tel Aviv, Jerusalem, Haifa, the Middle East. Scale 1 : 285,120. Produced under the direction of ALEXANDER GROSS, F.R.G.S. 40×30. Index of place-names. London : Prepared for *The Jewish Chronicle* by Geographers' Map Co. Ltd. Third edition, 1951. *2s 6d.*

There is a very good index of places, so it is assumed that the map was printed mainly to show the towns and villages. No distinction is made between first and other class roads. The rivers are indistinct, and mountains are shown by name only, with an occasional height. As Israel and the countries bordering on it are shown in different colours, the U.N. partition plan boundaries might have been made more apparent. The map is badly printed and many names are indistinct. Railways are blurred into a black line, and in the plan of Haifa the names of some of the main streets can be read with difficulty. If the policy is to provide a map at a low price, the map fulfils its purpose for locating places listed in the index. J. M. M.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

PROCEEDINGS

MEETINGS OF COUNCIL were held on 15th January, 26th February, and 8th April 1952.

OBITUARY

The President's tribute to the memory of KING GEORGE VI is recorded on p. 1 of this issue.

The following telegram was sent to the Queen's Private Secretary :

> " It is with the deepest sorrow that the Royal Scottish Geographical Society learns of the death of its beloved Patron and tenders its humble duty. JOHN BARTHOLOMEW, President."

The reply from the Private Secretary was as follows :

> " The Queen desires me to send her sincere thanks for your kind message. PRIVATE SECRETARY."

Council also recorded its sorrow at the death of Most Hon. THE MARQUESS OF LINLITHGOW, a Vice-President of the Society, and of Mr J. A. ROBERTSON DURHAM, for many years Auditor of the Society.

MEDAL AWARDS, 1951

The Livingstone Medal was awarded to ERIC E. SHIPTON for his enterprising leadership of the 1951 Everest Reconnaissance Expedition.

The Mungo Park Medal was awarded to W. H. MURRAY, Deputy Leader, Everest Reconnaissance Expedition 1951, for his work in the two Everest Expeditions, 1950 and 1951.

NEWBIGIN PRIZE : 1952 AWARD

A Bronze Medal and Money Prize will be awarded for the best Essay, suitable for publication in *The Scottish Geographical Magazine* and not exceeding 7000 words in length, on any subject relating to the geography of Scotland.

Essays, typed and with any illustrations prepared for reproduction, in envelopes marked " Newbigin Prize," must be lodged with the Secretary, Royal Scottish Geographical Society, Synod Hall, Edinburgh 1, on or before 31st October 1952.

NOTICE

In view of the great demand from overseas, the following numbers of *The Scottish Geographical Magazine* are very urgently required :

Vol. **2**, Nos. 3, 10, 11 ; Vol. **13**, No. 11 ; Vol. **19**, Index ; Vol. **20**, Nos. 1, 5 ; Vol. **22**, Nos. 3, 6 ; Vol. **25**, No. 8 ; Vol. **26**, No. 3 ; Vol. **34**, Nos. 3, 4, 10, 12 ; Vol. **35**, Nos. 1, 2, 3, 8, 9 ; Vol. **36**, No. 1 ; Vol. **37**, Nos. 1, 2, 4 ; Vol. **40**, Nos. 2, 4 ; Vol. **41**, Nos. 1, 2, 6 ; Vol. **47**, No. 6 ; Vol. **53**, No. 1 ; Vol. **58**, Nos. 1, 2, 3 ; Vol. **59**, Nos. 1, 2 ; Vols. **58-59**, Index ; Vol. **60**, No. 2 ; Vol. **61**, No. 2 ; Vols. **60-61**, Index ; Vol. **62**, No. 3.

Bound volumes will also be gratefully accepted. It would be much appreciated if such copies of separate numbers and of volumes be handed without delay to the Secretary.